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DEVOTED TO THE CONSTRUCTION AND MAINTENANCE OF ROADS AND STREETS

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REORGANIZATION OF THE PHILADELPHIA BUREAU OF HIGHWAYS AND STREET CLEANING

An outline of the work of reorganizing the Bureau of Highways and Street Cleaning of the city of Philadelphia, Pa., forms a large portion of the annual report of Wm. H. Connell, Chief of that bureau. This report is reviewed at length in the first article in this issue of "Good Roads."

In taking up this work, Mr. Connell found a bureau in which, as set forth in his report, there was only one civil engineer, in spite of the fact that the bureau was one dealing entirely in engineering problems. He also found the records of work done under the specifications for street cleaning and garbage removal were "more or less valueless" and that the same condition prevailed throughout the bureau in connection with records in general. This deficiency in the records was particularly embarrassing when it became necessary to make up the 1913 budget, as there were not sufficient data on the cost of work in past years to enable the officials to make the estimates.

The reorganization of the bureau undertaken by Mr. Connell has included the personnel, the office procedure, the physical rearrangement of the offices and the drawing of new specifications, as well as the introduction of new methods for the construction and maintenance work in charge of the bureau. Engineers have been selected to fill engineering positions; titles, grades and salaries have been readjusted and plans have been made to promote from one position to another through civil service examinations; authority to carry on specific work and responsibility for its performance have been delegated to certain individuals, and the duties and functions of the various branches of the bureau have been defined and coordinated by making provision for bringing together the different branches of the work under the supervision of responsible heads. In all of the reorganization the plan has been to centralize the control of the work and to carry it on under the bureau as a unit rather than under a collection of separate and distinct divisions.

Among the changes in office procedure have been the establishment of a central correspondence division and a central stenographic division, the provision of new account forms and the making of new arrangements for obtaining supplies. Careful studies have also been made of the system of issuing permits and licenses, with the result, it is said, that in the future the revenues of the city will be considerably increased by the readjustment of fees which were formerly too low.

Another by no means unimportant change made has been in the physical arrangement of the offices. This has included the shifting of some of the divisions of the bureau, the erection of partitions and the separation of work of different kinds; all of which, though comprising details of the reorganization, is said to have resulted in a considerable increase in efficiency. Besides these changes many others have been made and are noted in the article previously referred to.

Proper organization is one of the first essentials for effective work by any department of government, and is also something which is not always easily secured. The work which has been done in Philadelphia appears to have been thorough, and its details should prove of interest to officials everywhere, not only in cities, but also in counties, states and other governmental units.

ROAD AND STREET PLANNING

Engineers engaged in highway work, especially those whose work is in towns and cities, will find many helpful suggestions in the paper by Nelson P. Lewis, printed elsewhere in this issue. As Chief Engineer of the Board of Estimate and Apportionment of New York City, Mr. Lewis is constantly meeting the problems he discusses and is thoroughly conversant with conditions not only in his own city—where the questions incident to street work are extremely complex and varied—but also in other cities, both large and small, and in rural districts as well.

In considering the layouts of road systems in large areas, such as states and counties, Mr. Lewis calls particular attention to what may be designated as the radial and rectangular plans. Most road systems—or more properly, perhaps, networks of roads—in this country, at least in the older portions, are natural growths and not the results of studied plans. Roads have been opened when and where needed and a system developed from these is generally neither radial nor rectangular in character. Some of the systems that have been planned in advance have been laid out in one of these two ways; others in neither way.

No general rule for the adoption of either plan can be laid down, for, as in all problems arising in highway work, local conditions necessarily govern. Present and future traffic, the probable development of new centers and the expected expansion of existing populous areas, topography and available funds, and the requirements of their distribution are all factors that must be considered. There are, however, some fundamental principles that should be observed and these are included in the author's summary of essential considerations.

The first point made by Mr. Lewis in summarizing the essentials of proper location—that the road should be made as direct as topography and limiting grades permit, but not monotonously straight—is worthy of the most careful consideration. Alignment is much more important now than formerly, because of the change in character of traffic which has come about in recent years. Though the directness of a road is perhaps not so essential for motor cars as for horse-drawn vehicles, from the standpoint of distance, the avoidance of sharp curves is essential as a matter of safety. The flattening of curves and the elimination of obstructions to view on their inner sides are matters of paramount importance in the location of roads designed to accommodate vehicles driven at high speeds. It should also be remembered that though grades should be kept within limits, long, unbroken gradients should be avoided as carefully as the monotony in alignment which operators of motor cars find unpleasant and fatiguing.

Another point made by Mr. Lewis, though not included in his recapitulation, will be noted with interest by experienced municipal engineers. This is that a city should not grow by accretions of fully developed areas nor its street plan expand by additions of completely platted areas. Anyone desiring to see the results of such growth can do so by examining a street plan of almost any large city, in which he will generally find a number of relatively small districts, the streets of which bear no relation to those in the surrounding area. These sections have either grown up without any well developed plan and have then been taken into the city or else they represent real estate developments in which the holdings have been cut up by streets in such a way as to bring the maximum return for building sites and have then been enveloped by the expansion of the city near which they are located.

While growth of this kind is open to serious objection, the statements made should not be taken as arguing against the proper planning of areas which are manifestly destined to become part of a city. In such cases laying out the streets in the areas some time before they are annexed, if it be done properly, is always to be desired. Such work should be under the control of the city through its highway department or some special department, and the streets should be laid out and their grades established, keeping in mind not only the needs of the particular locality they traverse but also the street plan of the city as a whole.

In this connection, it may be well to direct attention to another matter which, though a detail not mentioned specifically in Mr. Lewis' paper, is yet of importance—that is, the desirability of establishing building lines, sidewalk and curb lines and the grades of the street, curb and walk before abutting property is developed. Engineers engaged in street work, especially in small cities and large towns, are fully alive to the embarrassments and difficulties incident to the performance of this work after the adjoining property has been built upon. In this case, it is a matter of extreme difficulty to adjust the lines and grades in such a way as to obtain the best results for the street as a whole without damaging the abutting property, and in practice it is too often necessary to sacrifice alignment and grade in order to avoid this.

Probably the most costly work resulting from improperly planned street systems in cities is that of widening to meet the demands of increased traffic. Many examples of this have been afforded in New York City, where it has been necessary to widen some of the principal streets at enormous cost. The designing of highways to provide for future growth is of necessity a difficult problem, since a city's expansion depends upon so many different influences, not all of which can be foreseen. At the same time, in planning streets through portions of a city which are not fully developed, a careful study of present conditions and probable future conditions will often lead to the making of a plan which will prove reasonably adequate in future years.

The last point made by Mr. Lewis—that roads should be made interesting and attractive—is one to which too little attention has probably been paid in the past. The roads, while carrying a constantly increasing commercial traffic, are being used more and more for pleasure, and this should be taken into consideration in the planning of systems and individual highways. The difference in cost between a location devoid of scenic beauty and attractiveness and one which provides a picturesque and equally serviceable road often amounts to a comparatively insignificant amount, and the expenditure of this sum will in most cases be justifiable.

RECENT HIGHWAY LEGISLATION

Several pages of this issue are given to reviews of recent highway legislation in four states, where new laws have been enacted and old laws changed, with a view to bettering the administration of highway affairs.

Among the most interesting features of a highway law are the provisions of its administration. Each of the four states which have recently passed new laws—Arkansas, Maine, Minnesota and Missouri—has dealt with this in a different way. In Arkansas, which until the passage of the present law had no central highway authority, a commission of three has been established. The new Maine law substitutes for the single commissioner formerly having charge of road work a commission of three. In Minnesota and Missouri no changes have been made in this respect, the Minnesota commission still consisting of three members, and one chief officer remaining at the head of the state highway department in Missouri.

While in three of these four states the work is in charge of a commission of three members, there are marked differences in the details of administration.

In Arkansas the chairman of the commission is the Commissioner of State Lands, Highways and Improvements, this department having formerly been the Department of State Lands. The other two members are appointed by the Governor. The salary of the chairman is $2,500 a year, and the other two members receive $5 a day and their traveling expenses for the time actually engaged in the work of the department.

By the terms of the Maine law, the Governor, with the advice and consent of the Council, appoints the members of the commission, each of whom receives a salary of $1,000 a year with an allowance for expenses incident to the performance of his official duties. The terms of office of the first three commissioners appointed under this law are to be two years, three years and one year respectively, and succeeding commissioners will hold office for three years each. The first member appointed for three years will serve as chairman of the commission during his term, and the succeeding chairmen will be chosen annually by the members of the commission.

The members of the Minnesota commission are appointed by the Governor and serve three years each, one being appointed each year. They serve without compensation and elect from among themselves a chairman and a vice chairman.

In Missouri the State Highway Commissioner is appointed by the Governor, with the consent of the Senate. He serves for four years and receives a salary of $3,000 a year. The law provides that he shall be "a competent civil or highway engineer or be experienced in the construction, improvement, maintenance and repair of public roads."

Besides the commissioners, subordinate executive officers and engineers are provided for by the laws of each of the four states.

In Arkansas the Department of State Lands, Highways and Improvements is allowed one deputy in addition to the force formerly attached to the Department of State Lands, and the Commissioner of State Lands, Highways and Improvements is required to appoint a state highway engineer. The State Highway Engineer must "be a graduate of some reputable school of engineering and shall be skilled in surveying and road building." He receives $3,000 a year, and is appointed for any term determined by the commissioner, not exceeding two years. It is also provided that the head professor of civil engineering at the State University be ex-officio consulting engineer to the department. He receives no salary but is allowed traveling expenses while in the service of the department.

The Highway Commission of Maine is required to appoint, with the approval of the Governor and Council, a chief engineer to have general charge of the work. This official holds office during the pleasure of the commission, which also fixes his salary. The engineer, with the approval of the commission, may employ such other engineers, supervisors and assistants as he may deem necessary.

The Minnesota commission, under the terms of the law, is authorized to appoint a secretary to serve as state engineer and also deputy engineers and such other assistants as may be required. The secretary and engineer must be "a civil engineer and practical road builder."

In Missouri, the State Highway Commissioner is himself the chief engineering officer of the State Highway Department. His salary is fixed at $3,000 a year and his term of office is four years. He is authorized to appoint one deputy highway commissioner, who, like the commissioner, must be a competent civil or highway engineer. The deputy performs such duties as may be designated by the commissioner, holds office at the pleasure of the commissioner and receives a salary of $2,000 per year.

Since the laws under which a state operates in the betterment of its highways determine to a great extent the results achieved in highway improvement in that state, the details of the four new laws should prove of interest to road builders and highway officials. Among the details, those pointed out here are perhaps of especial interest as showing the manner in which some of the problems of organization have been met in specific cases.

Kinds of Pavement Laid in the City of Albany, New York

In the report of the Bureau of Engineering of the Department of Public Works of Albany, N. Y., which is noted on another page of this issue, several tables are printed which contain interesting information regarding the paving work of Albany during the past 28 years. One of these tables shows the number of miles of streets paved with each of eight different kinds of pavement, at the close of each year from 1885 to 1912; another shows the percentage of each of these same kinds of pavements, at the close of each year during the same period, and a third shows the area in square yards laid in each of the 28 years covered by the tables.

At the close of the year 1885, the pavements of the city were made up of 49.252 miles of cobble, 11.216 miles of granite, 1.654 miles of stone blocks other than granite and 1.5 miles of macadam, making a total of 63.622 miles. The percentages of these four kinds at that time were 77.42, 17.63, 2.60 and 2.35, respectively. At the close of 1912, the mileages of these same kinds of pavements were: Cobble, 7.639; granite, 32.282; stone blocks other than granite, 0.770; macadam, 6.433. The percentages were: 7.99, 33.76, 0.81 and 6.73, the remaining 50.71 per cent., consisting of 37.592 miles, or 39.32 per cent. of vitrified blocks, 9.998 miles or 10.46 per cent. of sheet asphalt, 0.824 miles or 0.86 per cent. of block asphalt and 0.071 miles or 0.07 per cent. of concrete with a bituminous surface, the total mileage of all pavements at the close of last year being 95.069 miles.

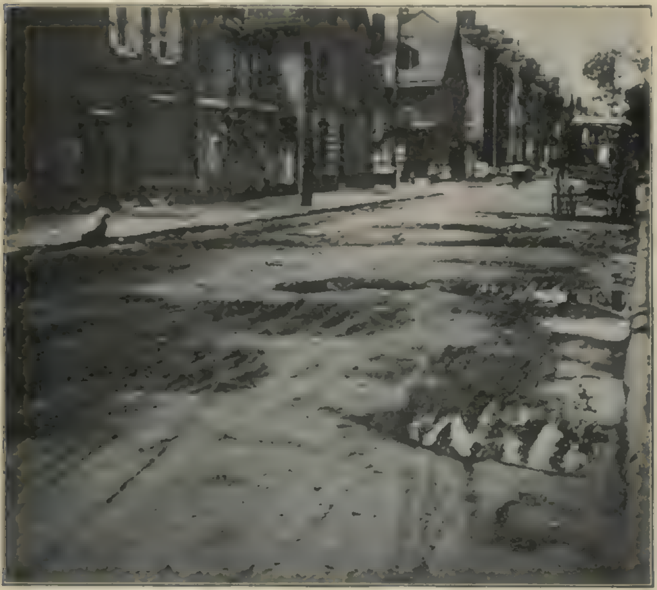
At the close of each of the 28 years covered by the tables the percentage of cobble pavement has been less than at the close of the preceding year, the decrease being due not only to the increased mileage of other pavements put down, but to the removal of the old cobblestone. In 1885 and previous years, 866,838 sq. yds. of this pavement were laid, and it continued to be put down until 1893, although the amount taken up each year greatly exceeded that put down. The percentage of granite pavements increased from 17.62 in 1885 to 35.69 in 1895. From the close of that year until the close of 1910, the percentage of granite varied between 35.12 and 36.93. At the close of 1911 it was 34.75, and at the close of 1912, 33.76. In actual amount laid, granite increased from 1885 until 1889, and decreased from then until 1893. From that time until the present the amounts laid in different years have varied from 14,906.4 sq. yds. in 1893, 36,990.7 in 1895, 26,729.2 in 1896, 12,340.4 in 1901, 12,225.7 in 1904, 12,693.1 in 1905 and 14,193.6 in 1908, to 771.2 in 1898, 1,368.5 in 1899, 1,766.8 in 1903, 1,033.5 in 1906, 874.4 in 1908 and none in 1909.

The first vitrified blocks were laid in 1894, and at the close of that year formed 0.19 per cent. of all the pavements. Their percentage now is 39.32. The first sheet asphalt shown by the tables was laid in 1889, and at the close of that year formed 0.81 per cent. of the pavement of the city, while at the close of last year 10.46 per cent. of all the pavements in the city was of this material. The only block asphalt pavement shown consists of 14,500 sq. yds. laid in 1905, and the only concrete pavement with bituminous surfacing consists of 1,244 sq. yds. laid in 1912.

Work of the Philadelphia Bureau of Highways and Street Cleaning

The report of the operations of the Bureau of Highways and Street Cleaning of Philadelphia, Pa., for the year 1912, has been made by William H. Connell, Chief of the Bureau. It covers the work of reorganization undertaken during the year and now practically completed, besides the ordinary activities of the Bureau in which are included grading, paving, street cleaning, the collection of ashes and garbage, land drainage, the elimination of mosquitoes, snow and ice removal and bridge and sewer work.

The first part of the report deals with the reorganization of the personnel and procedure of the bureau, actual work on which began in March of last year. According to the report, it was carried on not only without interference with routine work but with an actual increase in volume and efficiency of work done. An idea of the necessity for reorganization may be gained from the following quotation from the report:

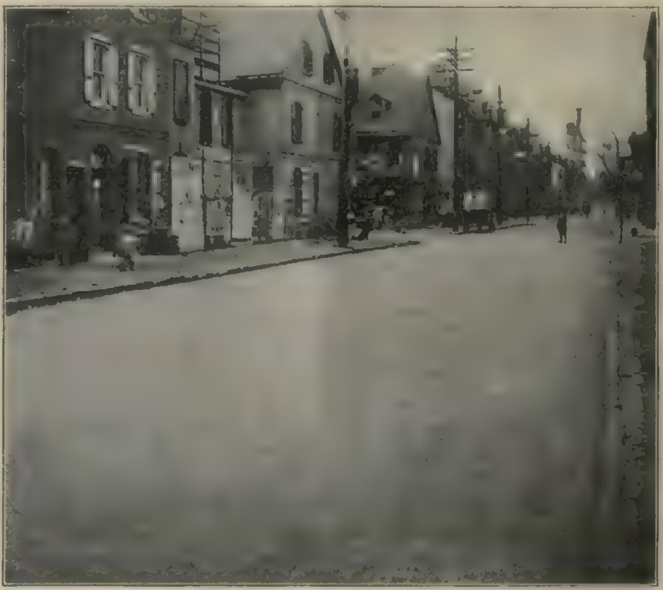


TYPICAL VIEW OF NEGLECTED ASPHALT PAVEMENT—PHILADELPHIA, PA.

"Notwithstanding the fact that the work coming under the jurisdiction of this bureau is distinctly engineering, at the beginning of 1912 the personnel of the Bureau of Highways and Street Cleaning was devoid of engineering talent, with one exception. The roster of the Bureau showed besides laborers, foremen, etc., 260 employes, one of whom was an engineer with the munificent salary of $1,500 per annum, and this lone civil engineer was assistant to a man without any engineering training whatsoever. For a bureau whose function is entirely engineering this was somewhat remarkable."

As organized at the time the report was rendered, the force of the bureau included 15 assistant engineers, 17 engineering inspectors and 80 inspectors, most of whom were engineers. The filling of existing vacancies, it is stated, will increase this force to 23 assistant engineers, 19 engineering inspectors and 80 inspectors; and during the construction season there will be an additional corps of temporary inspectors at $100 per month each. Under the readjusted plan of titles and grades inspectors of the lowest grade will receive $100 per month, other inspectors $1,300 per year, engineering inspectors $1,300 and $1,500, assistant engineers $1,500, $1,800, $2,100, $2,500, $3,000 and $4,000. It is planned to fill the various positions largely by promoting men from lower grades by means of civil service examinations.

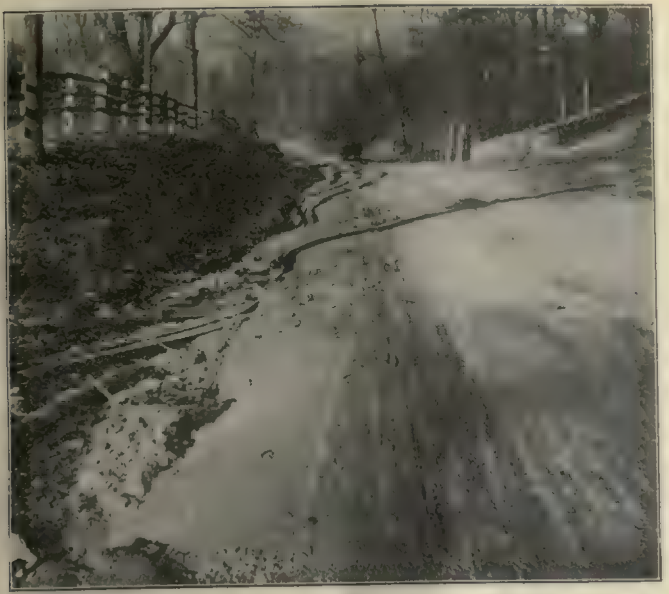
The report includes two charts, the first showing the former organization of the bureau and the second the proposed organization. The latter chart was printed on page 87 of this journal for Feb. 1, 1913, to illustrate a paper entitled "The Organization of a Highway Department for a Large City," presented by Mr. Connell at the ninth annual convention of the American Road Builders' Association at Cincinnati, Ohio, in December of last year. At the date of the report, it is stated, the proposed organization was virtually in effect. The number of highway districts had been reduced from eight to seven and it was expected that early in 1913 the number would be still further reduced to six. Some readjustment of the street cleaning districts was also planned in order to make them correspond to the highway districts.



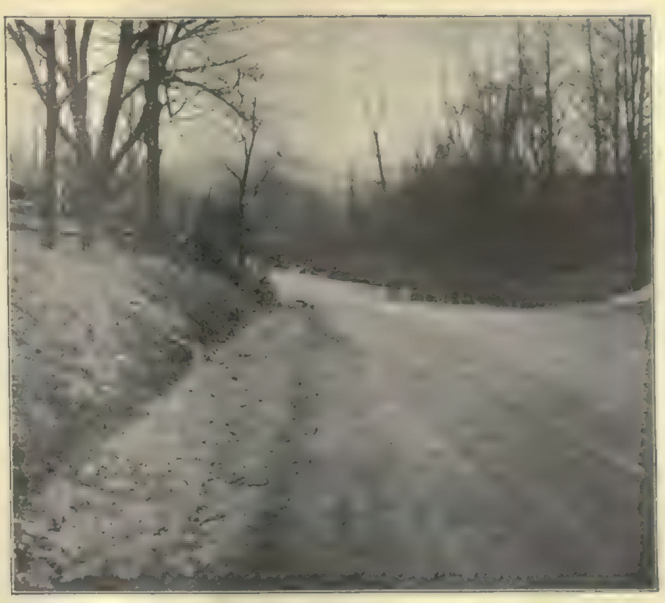
STREET SHOWN IN ILLUSTRATION OPPOSITE—AFTER IMPROVEMENT.

With the intention of centralizing the control and carrying on the work of the bureau as a unit rather than as a collection of separate and distinct divisions, certain individuals have been delegated administrative powers for specific purposes, one of the most important changes of this kind having been the making of the Street Cleaning Division a part of the bureau. The former plan, by which this work came under the charge of a separate division, resulted in inefficient control and unnecessary duplication of work, according to the report. Under the new scheme of organization inspectors assigned to street cleaning work will act as street patrol inspectors also, and street cleaning and the collection of ashes and garbage will be under the supervision of the district engineers.

The office procedure, arrangement and personnel have been revised, perhaps the most notable examples, according to the report, having been the establishment of a central correspondence division and a central stenographic division. New account forms have also been provided, new arrangements have been made for obtaining supplies, and the offices themselves have been rearranged with a view to facilitating the conduct of the business of the bureau. Among



VIEW SHOWING CONDITION OF A COUNTRY ROAD, PHILADELPHIA—BEFORE IMPROVEMENT.



VIEW OF THE ROAD SHOWN IN THE ILLUSTRATION OPPOSITE—AFTER IMPROVEMENT.

other matters which have been investigated are the issuing of permits and licenses, the control of stores and the development of cost records.

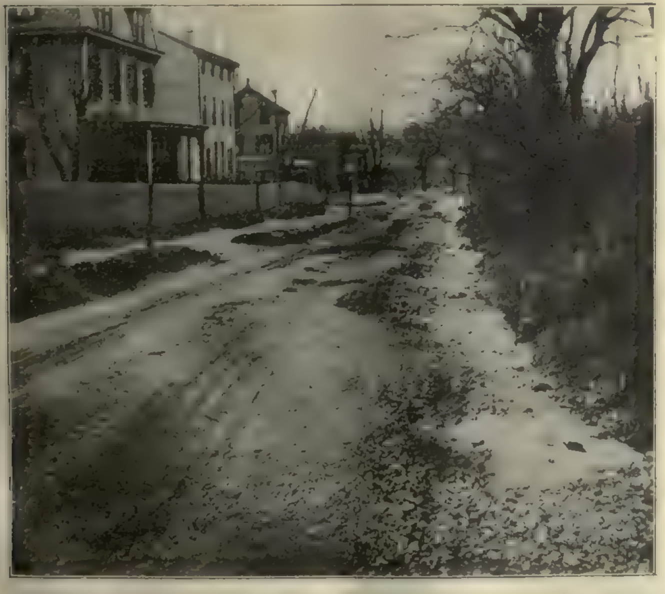
According to the report, the records of the character and mileage of pavements in the city, as well as most of the other records found on file in the bureau, were found to be "more or less valueless." By cooperating with the Bureau of Surveys a survey of the existing pavements was made, the result of which is shown in Table I.

The absence of properly kept records made the preparation of the 1913 budget of the bureau a matter of considerable difficulty on account of the resulting lack of information regarding the costs of various classes of work in previous years. A satisfactory budget was gotten out, however, the bureau officials having resorted to the plan of prorating the estimates from the cost of similar work in New York City.

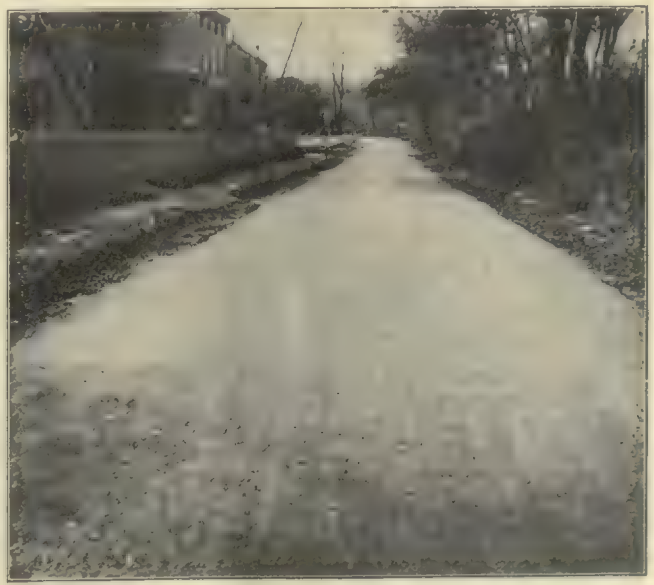
During 1912, according to the report, there were 403 contracts in force, on which $3,849,021 was expended in the maintenance and construction of city streets and country roads, the collection of ashes and garbage, street cleaning and bridge and sewer maintenance. In addition, $738,143 was expended for work done by city forces in the maintenance of streets, roads, bridges and sewers, thus bringing the total expenditures of the bureau up to $4,587,164. There were also awarded 104 contracts, amounting to $1,326,433, on which active construction work had not commenced at the date of the report.

TABLE I.—KIND AND AREA OF EXISTING PAVEMENTS IN THE CITY OF PHILADELPHIA.

Character.	Sq. yds.	Miles.
Granite block	6,653,532	352.99
Asphalt (sheet)	6,959,656	472.35
Asphalt (block)	72,532	7.49
Vitrified block	2,376,224	163.63
Cobble	162,775	14.02
Rubble	93,182	6.69
Slag block	78,071	8.13
Cement and granolithic	54,242	11.03
Wood block	121,505	4.06
Total	16,571,719	1,040.39
Bituminous macadam roads	312,104	29.01
Water bound macadam roads	3,035,429	261.31
Total macadam roads	3,347,533	290.32
Grand total (improved pavements and macadam roads)	19,919,252	1,330.71
Earth roads	......	179.60



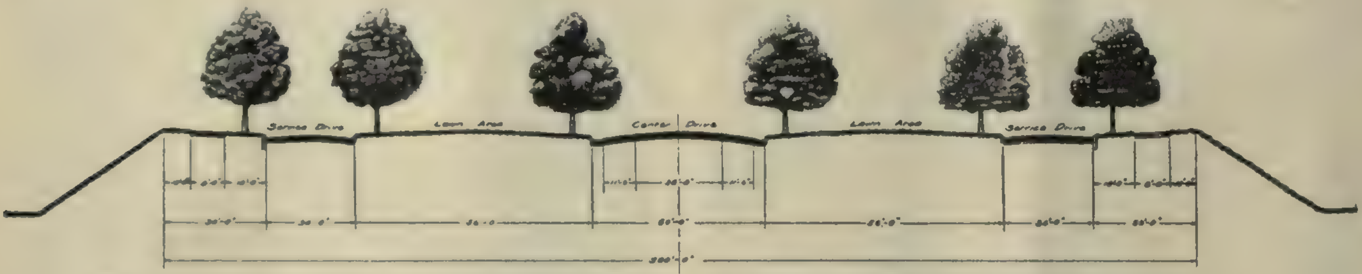
VIEW SHOWING CONDITION OF ANOTHER COUNTRY ROAD, PHILADELPHIA—BEFORE IMPROVEMENT.



VIEW OF THE ROAD SHOWN IN THE ILLUSTRATION OPPOSITE—AFTER IMPROVEMENT.

In order to bring the specifications of the bureau into conformity with the best engineering practice, it was found necessary to completely revise them, including those for garbage removal and street cleaning. In all of this revision the standardization of the work and a more thorough control by the bureau were the primary considerations. All the streets to be cleaned were classified, and it was decided that all employes must wear uniforms and badges carrying serial and district numbers and the inscription "D. P. W., Bureau of Highways," and that all instruction cards and equipment must be similarly lettered. The contractor's name formerly appeared on the cards, equipment and uniforms, with the result that complaints went to contractors instead of to the city authorities, thus making it difficult for the bureau to maintain effective control and supervision of the work.

Formerly the only work performed by the city forces was in connection with the repair of granite block and brick pavements and the making of minor repairs to roads and drains. It was decided that the maintenance of macadam roads could be carried on more efficiently and economically by day labor and this method was adopted, though it made necessary the creation of an entirely new organization and the purchase of the requisite equipment. It is stated that the excellent results obtained during the first year of operation under this plan fully justified the change, and that as it is generally recognized that certain classes of maintenance work can be more efficiently carried on by city labor than by contract, it will be the policy of the bureau to extend this mothod as far as is practicable.



TYPICAL CROSS SECTION OF FINISHED HIGHWAY—NORTHEAST BOULEVARD, PHILADELPHIA, PA.

Because the expenditures in former years for street maintenance were inadequate and because the methods employed were not in conformity with modern practice, according to the report, the streets had been allowed to deteriorate so much that even with the amount expended last year they could not be gotten into satisfactory condition. It is stated that a large proportion of the pavement in the city was laid without a suitable foundation, and that the result was that not only was the maintenance cost very much higher than it would have been had the pavements been properly built originally but the life of the pavements was less. As a consequence, it was necessary to expend about $500,000 for patching and resurfacing asphalt streets alone.

A number of recently developed forms of construction have been introduced, it is stated, the repaving of Broad St., from Cumberland St. to Silver St., with redressed granite blocks being cited as an example. This work involved removing the old blocks, cutting them in half and relaying them with the cut end uppermost and then grouting the pavement with Portland cement mortar. It is said that the result was a pavement with a life fully equal to that of a new granite block pavement, built at a cost of a little less than one-half of that of one with new blocks, and having the added advantage of a surface much smoother than that of the original pavement. Contracts amounting to $149,200 were also let for replacing rough and noisy granite block pavements near hospitals with wood block and sheet asphalt pavements.

Only $470,468.26 was available in 1912 for the reconstruction and maintenance of the 296 miles of macadam roads in the city. It was decided to utilize the larger portion of this money for rebuilding the heavily traveled main routes with bituminous pavements and to spend the remainder for resurfacing the less important main routes with water bound macadam and for repairing other roads merely to the extent of eliminating dangerous conditions. During the year, 23.96 miles of bituminous pavements of various types were constructed under contract, while 21.39 miles of water bound macadam roads were resurfaced. In addition, considerable work was done in the surface treatment of water bound macadam roads, the methods followed in each case, having been varied to suit the traffic, grades, and other conditions.

Mention is made in the report of the service test roadway on the Byberry and Bensalem Turnpike, a portion of the through route to New York. This roadway, having a length of 3.42 miles and comprising 26 sections each of a different type of construction, was about two-thirds completed at the date of the report. Careful records of the cost of maintenance and the condition of the various surfaces are to be kept and yearly reports will be made.

Considerable space is given to plans for 1913 work, which, it is stated, will be performed in conformity with the policy laid down in 1912. Macadam work will consist principally of extending through routes and building missing links in the city's system of main thoroughfares. In the repaving work —for which the available funds are said to be inadequate— the most careful consideration of the needs of the city as a whole will be necessary. It is proposed, however, to effect as far as possible the replacement of noisy pavements with noiseless ones, extending the work to streets adjoining schools.

Among the projects for 1913, one of those taken up in detail in the report is the completion of the Northeast Boulevard. When completed, this thoroughfare will extend from the intersection of Broad and Cayuga Sts., to Solly St., near Holmesburg, where it will divide into three branches, one extending towards Bustleton, one in a northeasterly direction to form a secondary route to Bristol and Trenton, and one toward Torresdale. Besides affording a route to and from a rich farming section, the road will connect Fairmount and several smaller parks. It will be 300 ft. wide, having a central driveway 60 ft. in width, and two service drives each 34 ft. wide, the remaining space being taken up by parkings and promenades. A typical section of the boulevard is shown in the accompanying sketch. According to plans outlined in the report, the center and side drives will be of bituminous macadam with brick gutters. The report places the amount available for the Northeast Boulevard work at $1,015,000, which, it was estimated, would suffice only for the completion of the sewers, the grading, paving of the central driveway, walks, surface treatment and part of the planting.

Other work for 1913 which is covered by the report includes the development of the Southern Plaza, Southern Boulevard and League Island Park. Plans for this work were revised under the direction of Olmsted Bros. and at the date of the report were before the Art Jury for approval. The grading of the Plaza was under way while on the Southern Boulevard and at League Island Park work had been suspended; in the former case pending negotiations with the

Pennsylvania and Baltimore & Ohio railroads in reference to crossings, and in the latter because a supplementary contract, under which the work was being prosecuted, had been declared illegal and readvertisement ordered.

In regard to snow removal, the report states that a snowfall of 7½ ins. on Dec. 24 last placed the bureau in a peculiar position. There was no money available for its removal and it became necessary to secure the aid of different contractors, with the understanding that the Councils would be asked to pay their bills. The cost of this snow removal was $5,577.

TABLES SHOWING THE OPERATIONS OF THE BUREAU OF HIGHWAYS OF PHILADELPHIA, PA., DURING THE YEAR OF 1912.

Table II.—Contract Work Completed.

Kind of work.	No. of contracts.	Length in miles.	Sq. yds.	Cost to property owners.	Cost to city.	Cost of contingent work.	Total cost.
Grading	84	12.30	*320,463	......	$119,479.26	$162.80	$119,642.06
Paving:							
Asphalt	129	13.10	218,891	$337,363.94	48,224.89	3,431.10	389,019.93
Vitrified block	16	1.99	49,499	63,565.77	21,019.81	1,895.88	86,481.46
Granite block	5	0.55	12,375	25,975.87	17,079.44	1,219.64	44,274.95
Water bound macadam	15	2.88	29,439	4,101.30	26,810.63	1,023.21	31,935.14
Repaving:							
Asphalt	54	5.91	83,750	......	137,145.86	5,739.35	142,885.21
Wood block	9	3.44	63,351	......	187,016.17	6,008.00	193,024.17
Vitrified block	6	0.43	8,010	......	8,551.81	640.37	9,192.18
Granite block	13	1.58	23,312	......	69,541.26	5,459.45	75,000.71
Resurfacing:							
Asphalt	31	9.08	138,718	......	179,411.28	1,848.68	181,259.96
Water bound macadam	3	4.84	68,019	......	39,904.42	2,113.10	42,017.52
Bituminous macadam	29	18.19	189,362	......	184,053.46	22,262.40	206,315.86
Patching: Asphalt	5	....	269,209	......	283,746.20	......	283,746.20
Surface Treatment: Oiling roads	2	....	290,851	......	16,298.55	......	16,298.55
Repairing, etc:							
Curbs and footways	1	....	......	......	1,516.67	......	1,516.67
Around fire hydrants, etc	1	....	......	......	1,602.73	......	1,602.73
Furnishing curbing, etc	1	....	......	......	699.97	......	699.97
Sprinkling:							
Paved streets	1	....	......	......	1,666.66	......	1,666.66
Macadam roads	1	....	......	......	3,908.18	......	3,908.18
Totals	406	74.29	....	$431,006.88	1,347,677.25	$51,803.98	$1,830,488.11

Table III.—Contract Work Partially Completed.

Kind of work.	No. of contracts.	Length in miles.	No. sq. yds.	Estim'd total cost to property owners.	Estimated total paving cost to city.	Estimated total contingent cost.	Estimated total cost when complete.	Estim'd cost of finished work.
Grading	13	6.18	*265,370	......	$314,898 94	$6,853.60	$321,752.54	$106,483.84
Bituminous macadam	4	0.85	7,116	......	38,215.15	615.80	38,830.95	35,245.86
Granite block	1	0.14	5,024	......	15,080.78	487.50	15,568.28	7,785.49
Total	18	7.17	....	......	$368,194.87	$7,956.90	$376,151.77	$149,515.19

Table IV.—Contracts in Force but not Started.

Kind of work.	No. of contracts.	Length in miles.	No. of sq. yds.	Estimated cost to property owners.	Estimated cost of paving to city.	Estimated cost of contingent work.	Estimated total cost.
Grading	35	5.23	*289,701	......	$129,898.86	$6,624.90	$136,523.76
Paving:							
Asphalt	39	5.29	103,506	$156,784.46	49,589.60	4,971.08	211,345.14
Vitrified block	10	1.17	23,762	44,024 27	10,970.23	113.80	55,108.30
Granite block	1	0.29	4,923	11,171.76	5,781.27	......	16,953.03
Water bound macadam	4	1.06	13,520	......	16,400.10	5,157.25	21,557.35
Repaving:							
Asphalt	14	1.95	30,838	......	56,756.12	2,400.44	59,156.56
Wood block	2	0.75	8,422	......	27,673.45	253.28	27,926.73
Vitrified block	10	2.26	35,825	......	80,051.70	4,753.40	84,805.10
Granite block	[illegible]	0.51	27,070	......	86,220.90	1,882.73	88,103.63
Resurfacing:							
Asphalt	3	1.71	24,051	......	29.061.39	588.39	29,649.78
Bituminous macadam	[illegible]	1.89	19,192	......	24,270.80	6,450.22	30,721.02
Water bound macadam	3	6.51	66,850	......	42,344.50	800.00	43,144.50
Totals	131	28.62	....	$211,980.49	$559,018.92	$33,995.49	$804,994.90

*Cubic yards.

Table V.—Work by City Forces.

Kind of work.	Length in miles.	No. sq. yds.	Cost of labor.	Cost of material.	Total cost.
Repairing:					
Asphalt	....	21,632	$18,471.01	$726.82	$19,197.83
Vitrified and granite block	....	464,404	160,227.50	27,599.43	187,826.93
Resurfacing:					
Bituminous macadam	0.63	6,597	5.690.00	2,950.00	8,640.00
Water bound macadam	12.91	157,261	59,016.00	32,978.00	91,994.00
Totals	13 54	649,894	$243,404.51	$64,254.25	$307,658.76

After that the bureau drew up new specifications dividing the section in the central part of the city into districts, assigning one or more dumps or sewer manholes to each district, and providing that no one contractor should be awarded more than two of the districts. By this arrangement it is expected that the removal of snow from the central part of the city will be accomplished with very little delay.

The report states that in 1912 the sum available for the maintenance of highway bridges was $82,253.22, which was slightly more than one-third of one per cent. of the city's total investment in bridges—$21,000,000. There were 289 bridges, and because of natural decay and different loadings from those for which they were designed their maintenance in proper condition with the meager funds available had become a serious problem. The general condition of the bridges, according to the report, was such that the necessity for repair work was imperative and the bureau was compelled to utilize the bridge repair corps for that work, although the proper function of that organization is the making of only minor repairs and the handling of various other jobs not large enough to be done by contract. During the year repairs were made on 138 bridges, at a cost of $50,007.71 for labor and material, and work done under contracts in force amounted to a total of $1,959.30. Late in the year contracts were awarded for work amounting to $21,980, but actual work was not commenced. The report states that, basing the estimate on the number, type and condition of the city's bridges, approximately $200,000 will be required annually for the next few years to place them in first-class condition.

Data showing the details of some of the operations of the bureau are contained in tables II, III, IV and V, which are self-explanatory.

Recent Highway Legislation in Arkansas, Maine, Minnesota and Missouri

Arkansas

New highway legislation creating a state highway commission and providing funds to be derived from various sources for the maintenance of the department was enacted by the Legislature during its last session and approved by the Governor March 31, 1913.

The law transforms the existing office of Commissioner of State Lands into a department of the state government to be known as the Department of State Lands, Highways and Improvements, and makes the Commissioner of State Lands the executive head of the department, with the title of Commissioner of State Lands, Highways and Improvements. The State Highway Commission, composed of two members, appointed by the Governor for terms of two years, besides the Commissioner of State Lands, Highways and Improvements, who is chairman of the commission, has general authority over all business of the department.

The chairman is required to appoint a state highway engineer, subject to the approval of the commission. He must be a graduate of some reputable school of engineering, and skilled in surveying and road building. His term of office is any period, not exceeding two years, which the chairman may approve. The head professor of civil engineering at the State University is made ex-officio consulting engineer of the department.

The salary of the chairman is placed at $2,500 per year, and that of the State Highway Engineer at $3,000 per year. The two appointed members of the State Highway Commission receive $5 per day and their traveling expenses while engaged in their duties, and the consulting engineer is allowed only his traveling expenses while in the service of the department.

The Department of State Lands, Highways and Improvements is allowed one deputy commissioner in addition to the clerical force previously allowed the Commissioner of State Lands. The deputy and clerical force are appointed by the chairman. One additional clerk may also be appointed when needed, by the chairman, with the approval of the Commission. His salary must not exceed $1,800 per year, and his duties are those of secretary to the commission. The State Highway Engineer is also allowed a clerk when needed, the clerk's salary to be not more than $1,200 per year.

Section 6 of the new law creates a special fund in the state treasury to be known as the highway improvement fund. It is made up of all motor vehicle license fees accruing in the office of State Lands, Highways and Improvements or other accounts in connection with the use of public roads. These accounts are collected under the direction of the Department of State Lands, Highways and Improvements. The salaries of all officers and employes and other expenses of the department are to be paid from this fund.

The State Highway Engineer, under the direction of the Commission, is required to prepare such information, reports, maps, records, etc., as may be of value on the subject of roads, highways, drainage, levees, and all other public improvements in the state, and to give advice, without charge, to all state and county officers having need thereof. All county judges and engineers, road commissioners and road overseers are required to attend at least one road institute each year for the purpose of practical demonstration and instruction.

Section 24 of the law provides for the collection of $10 from the owner of every motor vehicle defined in the law approved March 24, 1911. One-half of this sum is to be paid into the state treasury and credited to the highway improvement fund, and the other half to the county in which the owner of the vehicle resides. A fine of $3 is provided to be paid by delinquent motor vehicle owners.

The State Geologist and the Consulting Engineer are required to make such investigations and reports as the State Highway Commission may require from time to time. They are especially charged with the study of the road materials of the state, their location, cost, durability and facility of transportation.

Section 39 provides for the applications for improvements to roads and highways. Under this section the county court of each county where the proposed improvement is located is required to consider applications signed by not less than 25 taxpayers residing in the county in which the proposed improvement is located. The Department of State Lands, Highways and Improvements may if it so decides, proceed to lay out the work of improvement, select or approve the route to be taken, and when it shall be necessary to raise funds for the improvement may lay off an improvement district to be specially taxed according to the benefits to be derived therefrom, and prepare charters required for the improvement or supervision of roads and highways under the act. These charters may contain a provision for suspending the requirement of free labor on the public roads of any county or road district, or a provision allowing the same to be satisfied with the payment of 50 cts. per day; a provision for establishing an office of road commissioner or road engineer, for any county or road district; a provision dispensing with the office of the road overseer, and the substituting of such other officers as may be provided; a provision fixing the manner of selecting road officers, whether by popular election or by the county court or otherwise; a provision requiring all county roads to be worked by contract according to the plans and under the direction of the department of state lands, highways and improvements; a provision designating and classifying the several public roads in any county or district; or any other provision regulating the method to be employed in working the public roads of any county or district, the employment of labor thereon, the purchase of materials, work animals, tools and machinery, and the provision of funds therefor, which may be within the power of the county court to make.

A charter must receive the indorsement of a majority of the legal voters residing in the locality affected before it can be approved by the Department of State Lands, Highways and Improvements. Special taxes must be approved by the owners of a majority in value of the lands owned within the territory. The consent of non-resident landowners or foreign corporations is not required in such provisions.

If a majority of the qualified electors of the proposed district indorse the charter, an order is issued, decreeing the approval of the charter, and the Governor of the state must, upon recommendation of the State Highway Commission, issue a proclamation putting the charter into effect.

A highway improvement district organized for specific improvements and having the power to issue bonds, shall continue in existence so long as may be necessary for the purpose for which it was created. Every other organization created by charter for the improvement or supervision of roads or highways shall continue for two years after the approval of the charter, and at the end of each biennial period, if the majority of the electors entitled to a vote on the charter, have not indorsed and filed any amendment or substitute charter in the same manner as the first charter was secured, the original charter shall be considered as extended for two more years. Assessments are made under the direction of the State Highway Commission on lands benefited by the highway improvements.

Improvements on work contemplated in the highway charters are made under the direction and supervision of the Department of State Lands, Highways and Improvements, and the salaries and expenses of all officers and employes while on duty exclusively connected with any improvement district are charged to the district. The department may advertise in local papers or in papers published in other states for proposals for doing any highway work. It may also buy the necessary materials and implements, and may, in general, make all such contracts in the prosecution of the work as will best serve the public interest. Taxes are assessed by the county court, upon application of the State Highway Commission. The taxes are to be paid in annual installments, not to exceed 20 per cent. in any one year.

If any tax levied under the law shall prove insufficient for any particular improvement, the State Highway Commission is empowered to authorize the county court to make another levy on the property previously assessed, for a sum sufficient to complete the work.

When so provided in the charter, the State Highway Commission, acting as agent for any improvement district which is not coextensive with any county, city or town, may issue bonds signed by the members of the Highway Commission.

Section 75 provides that whenever it may be desired to create an improvement district to be under the control of any other authority than that of the Department of State Lands, Highways and Improvements, the charters of these districts must designate the commissioners therefor or the manner of electing or appointing them. There must not be less than three nor more than nine of these commissioners. The charter must also fix the term of office and pay of such commissioners, and these commissioners are authorized to take charge of the district, and assess the benefits, and make the required improvements, having the same powers and duties as are given the State Highway Commission and the Department of State Lands, Highways and Improvements.

The county court may apportion such amounts from the county funds as may lawfully correspond to any road or highway that is being supervised or improved.

Section 78 empowers the Department of State Lands, Highways and Improvements to employ convicts on the public roads. These convicts are placed under the care of the wardens and other officers named by the penitentiary authorities, the Department of State Lands, Highways and Improvements determining the work to be done and the time, place and manner of the work. The pay of wardens and the cost of clothing of convicts while employed on the public roads shall be borne by the state, while the cost of feeding and housing the convicts shall be borne by the county or improvement district in which they are working.

It is also lawful to provide in any highway charter for working the male county convicts of any county on the public roads of that county.

The expense of feeding, clothing and housing county convicts is charged to the county or district where they are working. Each county is credited with or paid the amount of costs incurred in the trial of the convict, and the convict himself shall receive the same credit per day on the costs and his fine or penalty as is now provided by law. Each county furnishing convicts in any special improvement district is entitled to a flat compensation for their labor, to be not less than 75 cents per day, to be paid in cash.

Section 82 provides that state or county convicts may be employed in preparing road materials at quarries or elsewhere under the direction of the Department of State Lands, Highways and Improvements, the expenses being charged to the state or county or district receiving materials.

Maine

The Maine Legislature, at its recent session, enacted a new law governing the administration of highway work in the state. The measure was approved by the Governor and will become operative July 12 of this year.

The new law abolishes the present office of State Highway Commissioner; creates a State Highway Commission; makes provision for a system of state highways, the furnishing of state aid for important county and town highways, the continuous maintenance of all highways to the improvement of which the state has contributed or shall hereafter contribute, and also provides for a bond issue, the proceeds of which are to be distributed equitably among the several counties of the state.

By the terms of the law, the Governor, with the advice and consent of the Council is required to appoint a State Highway Commission consisting of three members, one to serve three years, one two years, and the third one year. The salary of each member of the commission is $1,000 per year, with an allowance for expenses incurred while engaged in official business. As vacancies occur at the expiration of the above named several periods, appointments are to be made for three year terms.

The first member appointed for three years is to be made chairman of the commission, and shall continue in this capacity for his full term. Succeeding chairmen are to be chosen annually by the commission from among its own members. The Attorney General of the state is the attorney of the commission and his legal work for the State Highway Commission is done without extra compensation. All duties and the office of the present State Highway Commissioner, including all existing contracts to which the state is a party, are to be taken over by the State Highway Commission when the law becomes effective, July 12.

The commission, with the approval of the Governor and Council is empowered to appoint a chief engineer who must be a civil engineer, trained in highway construction. He holds office during the pleasure of the commission, and his remuneration is determined by the commission. Under the direction and control of the commission he has general charge of the office records and work of construction and maintenance, and employs such clerical and engineering assistants as he may deem necessary, with the approval of the State Highway Commission.

The State Highway Commission is charged with the duty of causing to be published charts and maps showing the location and mileage of all highways in the state, and is authorized to divide highways into three general classes: State highways, meaning a system of connected main highways through the state; state aid highways, by which is meant such highways not included in the system of state highways as are or shall be thoroughfares between important settlements or between settlements and their markets or shipping points, and, in so far as practicable, feeders to the state highways, and a third class, which includes all other highways not designated in the first two classes.

The commission is empowered to make and enforce rules and regulations relating to construction and maintenance of all state and state aid highways, and to direct the expenditure of all money for the construction and maintenance of all state and state aid highways. The commission may be consulted, without charge, by municipal officers and road commissioners on the subject of construction and maintenance of public highways.

The law provides that guide posts marking state and state aid highways shall be of suitable shape, height and design, as the commission may determine.

The commission is vested with all the powers of municipal officers, relating to the construction and maintenance of ditches and drains. Preference is given in employing help for highway work to the inhabitants of the town in which the highways are located.

The commission is authorized to lay out, construct and maintain a system of state and state aid highways. The entire expense of construction is to be borne wholly by the state. The State Highway Commission is given full power in the designation of state and state aid highways, but is required, after reasonable notice by publication, to give all interested parties an opportunity to be heard before commencing construction.

The law requires that whenever the construction of a state highway is commenced in any county, work must be continued on such highway until an improved section of it, at least seven miles long is completed, or until it connects with another section of state highway so that the combined sections constitute an improved way at least seven miles long.

Maintenance of state highways is placed under the direction and control of the commission, at the joint expense of the state and the towns in which the roads are located. The charge against the town for maintenance of its state highways shall equal the actual cost of the maintenance, but must not exceed $60 per mile per annum. The commission is empowered to grant towns such financial assistance as it may deem advisable.

Plans, surveys, estimates and specifications for all proposed state and state aid highway work are prepared under the direction of the State Highway Commission, and the commission has full power in the letting of contracts for work on such highways. Advertisements for proposals must be published in at least two public newspapers, printed wholly or in part in the state, and in one newspaper printed wholly or in part in the county where the proposed work is to be done, if there is such a newspaper in the county. Any town may submit bids, subject to the same regulations as individuals, except that no bond is required of towns.

In the event of the rejection of all bids for work under the law, or if no bids are received, the State Highway Commission is empowered to perform the work by any method which the Governor and Council may approve.

Section 12 of the law empowers the commission to purchase or take over for the state any such land as may be necessary to provide a change of location or alignment of any state or state aid highway, or to secure materials, including clay, gravel, sand and rock, with necessary ways and access thereto for work on state and state aid highways.

Section 13 forbids the expenditure of state bond issue funds for the construction of any highway within the compact portions of any town or more than 2,500 inhabitants. All state highways passing through such portions of said towns are required to be maintained by and at the expense of the town.

State aid highways are designated with the approval of the State Highway Commission by municipal officers who are directed to choose such practicable systems within their jurisdiction as will best serve outlying communities, connect adjoining towns and villages, and facilitate travel in reaching markets, railroad connections and state roads. Opinions with reference to such designations are entitled to a hearing by the State Highway Commission, provided they are presented in the form of a petition signed by 20 or more voters in towns in which they are located.

State aid highways are maintained under the direction and control of the State Highway Commission at the joint expense of the state and town in which they are located. The charge against the town for maintenance shall not exceed 50 per cent. of the actual cost of such maintenance, and the total charge must not average more than $30 per mile per annum.

In order to secure state aid as provided by the new law, towns must appropriate, in addition to the sums regularly appropriated for highway work, a share off the cost in amounts based upon the assessed valuation of the towns as follows: Towns having a valuation of $200,000 or less, not exceeding $300; towns having a valuation of over $200,000 and not over $800,000, not exceeding $533; towns having a valuation of over $800,000 and not over $1,000,000, not exceeding $600; towns having a valuation of over $1,000,000 and not over $3,000,000, may appropriate, in addition to the sum of $600, an additional sum of $66 for each $200,000 or fraction thereof in excess of $1,000,000; towns having a valuation of over $3,000,000 and not over $4,000,000 may appropriate not exceeding $1,333; and towns having a valuation of over $4,000,000 may appropriate in addition to the sum of $1,333, an additional sum not exceeding $133 for each $1,000,000 of the additional valuation.

Suggestions for the improvement of state aid highways must be filed by municipal officers on or before December 31 in the year 1913, and thereafter annually between July 15 and August 15 of each year. The report of the State Highway Commission on these suggestions must be made on or before February 20 following, and this report must be submitted to the voters of the towns at the next regular town meeting, at which time the question of appropriation is decided by the voters.

State aid is extended to towns having made appropriations described in the foregoing, in the following manner: To towns having a valuation of $200,000 or less, the state appropriates $2 for each $1 appropriated by the town; to towns having a valuation of over $200,000 and not over $1,000,000, $1 for each $1 appropriated by the town; to towns having a valuation of over $1,000,000 and not over $1,200,000, $.92 for each $1 appropriated by the town; to towns having a valuation of over $1,200,000 and not over $1,400,000, $.85 for each $1 appropriated by the town; to towns having a valuation of over $1,400,000 and not over $1,600,000, $.80 for each $1 appropriated; to towns having a valuation of over $1,600,000 the state appropriates $.75 for each $1 appropriated by the town. The money appropriated by the towns and the amounts appropriated by the State Highway Commission shall constitute a joint fund for the construction and permanent improvement of state aid highways.

Towns are allowed to appropriate, in any single year prior to the year 1920, an amount not exceeding five times the maximum amount which it may annually appropriate under the law, and the State Highway Commission may appropriate from any balance which may remain in the state highway fund a like increase of state aid money together with an additional sum equal to 25 per cent. of such increase of state aid. Such appropriation does not deprive the town of its right to the regular annual state aid in other years. The appropriations made under this section of the law are added to the joint highway fund of that town.

If any town desires that the whole or any portion of this fund shall be applied to the construction of a designated state highway, the same may so be applied at the discretion of the commission.

The State Highway Commission is required to provide for a system of patrol for all state and state aid highways.

The law authorizes the State Treasurer, under the direction of the Governor and Council, to issue from time to time, serial coupon state bonds not exceeding $2,000,000 in amount outstanding at any one time, payable at the state treasury within 41 years from the date of issue, at a rate of interest not exceeding 4 per cent. These bonds and the proceeds therefrom are to be designated as the state highway loan, and constitute a fund from which expenditures are to be made in carrying out the provisions of the law. Not more than $500,000 of such bonds can be issued in any one year.

To provide funds for the construction of state aid highways the law appropriates, for the year 1913, the sum of $250,000, and $300,000 annually thereafter. These amounts shall constitute a fund known as state aid fund, and can be used only for the construction of state aid highways except that any balance of the fund, which has not been expended by the 31st of December of each year, and is not required by virtue of any contract or otherwise, shall be added to the fund for maintenance and administration.

In order to provide funds for the administration of the duties and office of the State Highway Commission, and for the maintenance of all state and state aid highways as provided in the law, the sum of $50,000 is appropriated annually, constituting a fund known as the maintenance and administration fund. To this fund is added the balance unexpended at the end of any year from the state aid construction fund.

Minnesota

The state legislature of Minnesota at its last session enacted a new law governing the administration of highway work. In many respects the new law is a confirmation of the laws of 1905 and 1911, but several important amendments have been made, and in order that a comprehensive idea of the statutes governing state work in Minnesota may be presented, a complete digest of the entire new law is given herewith.

The measure, which was approved April 15 of this year, provides that on or before January 1, 1914, the Governor shall appoint one commissioner to succeed that member of the Board of Highway Commissioners created by the provisions of the law of 1905, whose term then expires, and that each year thereafter he shall appoint one commissioner until the three commissioners provided by the laws of 1905 are appointed, then each shall be appointed for three years. Not more than two members of the commission shall belong to the same political party. They are required to serve without compensation.

The State Highway Commission is authorized to elect from its members a Chairman and a Vice Chairman, and to appoint a Secretary who shall be a civil engineer and practical road builder, to be known as the State Engineer. It is also empowered to appoint deputy engineers and other assistants as may be required from time to time. The compensation of the deputies and assistants is determined by the commission.

Whenever practicable the commission is directed to investigate and determine the location of road material, ascertain the most improved methods of construction and maintenance, investigate the most approved laws in other states, and hold public meetings throughout the state whenever advisable. The commission is directed to make a printed report to the Governor on or before March 1 of each year.

To provide funds for state aid, section 12 of the new law authorizes an annual levy of one mill on each dollar of valuation on all taxable property of the state. The money thus raised, together with all money accruing from the income derived from investments in the internal improvement land fund and any other moneys accruing to the state road and bridge fund, however provided, constitutes the state road and bridge fund.

The sum of $150,000 for the year ending July 31, 1914, and a similar sum for the year ending July 31, 1915, are to be paid out of the state treasury for defraying the expenses of the commission, including the salaries of the State Engineer and his assistants. A limit of $15,000 per year is placed on the expenses of the office of the commission.

All accounts and expenditures after certification by the chairman of the commission are to be paid by the State Treasurer on warrants issued by the State Auditor. On or before the first Tuesday in March of each year, the State Highway Commission is directed to prepare an estimate of the probable sum of money that will accrue to the state road fund during that year, and apportion it among the different counties of the state, not less than 1 per cent nor more than 3 per cent of the state road and bridge fund available in any one year to be apportioned to any one county. Any funds in excess of one-half of 1 per cent of the total available funds for allotment in any one year, allotted to any county in any year, which, for a period of two years after such allotment shall remain unused and unexpended by such county shall revert to the unapportioned funds of the state road and bridge fund, and shall be apportioned during the succeeding year in the same manner as are other funds added to the state road and bridge fund.

Twenty per cent. of the allotment made to any county is to be used only for maintenance of state roads and bridges therein. Not more than 25 per cent. of the apportionment from the state road and bridge fund of any county, after the 20 per cent. for maintenance has been deducted, may, at the discretion of the county boards and under the direction of the State Highway Commission, be expended on county roads under state supervision.

The amount to be paid by the state for state aid in the construction and maintenance of roads and bridges to any one county in any year shall be as follows: In counties where the assessed valuation is less than $5,000,000, 80 per cent.; where the taxable property is more than $5,000,000 and less than $10,000,000, 70 per cent.; where the valuation is $10,000,000 and not more than $15,000,000, 60 per cent., and in all other counties 50 per cent.

Section 18 provides that any county board may, with the consent of the State Highway Commission, designate any established road in its county, outside the corporate limits of any borough, village or city, as a state road. Also, in the event of the county commissioners of any county having refused an application made to it by at least ten freeholders resident of the county to designate any established road as a state road, the State Highway Commission may, at its discretion, designate such road as a state road without a prior designation thereof by the county board or its concurrence in such designation.

The council of any village or city of the fourth class may, with the consent of the State Highway Commission and the county board of the county in which such village or city is situated, designate any road not less than 60 ft. wide as a state road when the street or road so designated will constitute a direct connecting link with a state road leading to such city or village. The county board is authorized to designate the amount to be levied out of the county's state aid allotment for the improvement of the road. The state is not permitted to pay more than one-half the cost of improving any state road within the corporate limits of any city or village, nor in any event to exceed $1,500 dollars per mile, from the state road and bridge fund.

Section 20 relates to the duties of the Assistant State Engineers and provides that the State Highway Commission may appoint as many assistant engineers as may be deemed necessary, assigning each to one or more counties as may be deemed advisable. The duties of the Assistant State Engineers include making all necessary surveys, estimates and specifications for work to be done on state roads, consulting, upon request, with county or town boards in the construction of town or county roads and supervising their construction.

Section 21 relates to the procedure of county board of commissioners in improving state roads. If the estimated cost of the proposed work does not exceed $500, the board shall cause surveys to be made by the Assistant State Engineers assigned to that county when necessary, and shall receive bids, let the contract to the lowest responsible bidder, or else cause the work to be done by day labor under the supervision of the Assistant State Engineer. In case the estimated cost exceeds $500, surveys, plans and specifications are made by the Assistant State Engineer and submitted to the State Highway Commission for approval. In the event of the approval of the State Highway Commission, the county commissioners have the work done by contract or day labor under the supervision of the Assistant Engineer. The provisions of this section do not apply to any county which has or may hereafter have a population of 150,000 or more, and which has a County Superintendent of Highways or other officer to superintend the construction of roads within its confines.

When the work of improving state roads for which state aid is claimed has been declared satisfactory and accepted by the State Highway Commission, warrant for the state's share of the cost shall be issued payable to the treasurer of the county in which the work is done, upon certificate of the State Highway Commission, provided that the warrant, together with all other warrants, do not exceed the amounts allotted to that county.

Section 23 of the law designates the third Tuesday in June of each year as "good roads day," and the Governor is required on or before the first day of June to make public proclamation requesting the people of the state to contribute labor, material or money for the construction of highways in their respective communities on that day.

Whenever a petition asking for the location, alteration or vacation of any highway running into or through two or more counties, or partly on the line dividing two or more counties in any judicial district of the state, signed by 20 voters and tax payers, resident of the counties, shall be presented to a judge of a district court of the district or districts in which the proposed road is located, the judge is authorized to appoint three commissioners to lay out, alter or vacate the road in accordance with the petition, provided that no road ordered by the judge shall extend more than six miles out of the judicial district in which the application is made, and shall extend beyond the district only for the purpose of commencing or ending at some village or public road. The commissioners are authorized to appoint a surveyor and assistants to survey the road if so directed by the court. The commissioners are also empowered to appraise and fix damages to be paid to each landowner affected by the location of the road, such damages to be paid by the counties in which the road is located.

County boards of commissioners have general supervision over county roads, including those established in their county by judicial authority, and have the power to appropriate and expend such sums from the county road and bridge fund as may be advisable for county highway improvement. The county boards of commissioners are also authorized to appropriate money for the construction and maintenance of roads in adjoining counties when they deem it for the best interests of the public, but the amounts thus appropriated must not exceed $20,000 in any one year.

The county board is directed to set apart a fund for the construction and maintenance of roads and bridges in the county, to be known as the "County Road and Bridge Fund," and from this fund are paid the county's share of the expenses of construction of state aid roads and bridges and county roads and bridges in the county.

The voters of the county are empowered to authorize the issue of county bonds for hard surfacing or otherwise improving any established county road, when the expense of doing so exceeds the amount of any appropriation the county board is allowed to make therefor. The question of whether or not such additional expenses shall be incurred is placed before the voters upon petition by 50 or more voters or freeholders of the county. If the County Auditor receives such a petition, the county commissioners consider it and request an estimate of the cost of improvement to be made by the Assistant State Engineer of the district. If this estimate is furnished more than six months prior to the regular general election, the county board may, if it deems advisable, order a special election. The issue is determined by a majority vote of the electors. Such bonds shall bear interest not to exceed 6 per cent. per annum, payable annually in equal installments, the first of which shall become due and payable not less than five years after the date thereof, and the last not more than 20 years after the date thereof.

A county road and bridge tax not to exceed three mills on the dollar of taxable valuation is authorized by the law.

County roads, other than those established by judicial authority, are established, altered or vacated only by the county board. The county commissioner of any county having 200,000 or more inhabitants are empowered to declare any highway in the county outside the corporate limits of an incorporated town or village therein, a county road, and have general supervision over such roads, with full power to appropriate money from the treasury for their improvement. In such counties the county commissioners are also empowered to extend any street or avenue beyond the city or village limits to connect with any highway in an adjoining county. This extension, however, must not exceed one mile in length.

Whenever 24 freeholders of any county petition the county board for the improvement of any road or roads connecting with each other, and running into more than one town, the county board of commissioners is required to appoint a committee from among its members to investigate and report on the petition, and, according to the recommendations included in the report, to grant or reject the petition. If the petition is granted, the county board is to provide for laying out and constructing the road.

The town board of each town has general supervision of all town roads and county roads in accordance with rules and regulations made by the State Highway Commission, except in counties having a population of 150,000 or more and having a County Superintendent of Highways, in which case the town has no jurisdiction over county roads. The county board of each county has supervision over the maintenance of all bridges of the county, outside of the corporate limits of cities and villages, which originally cost $1,000 or more.

The electors of each town have the power at the annual town meeting to determine the amount of money to be raised for road and bridge purposes. The taxes for this must not exceed 15 mills on the dollar. After the annual town meeting, in case of emergency, the town board may levy a tax on the town in addition to the tax voted at the town meeting, in an amount not to exceed five mills on the dollar.

The county auditor of each county is authorized to levy a tax of one mill on the dollar on the taxable property of each town, outside the corporate limits of any borough, village or city therein, to constitute a fund known as the dragging fund, which is to be expended by the town board for dragging the town roads in the town. A limit of $1,000 is placed on the amount thus raised in any one town.

The new law abolishes the old office of district road overseer, and constitutes each town a road district with a road overseer for the entire town, providing for the appointment by the town boards of the overseer for the several towns. He has charge, under the supervision of the town board, of the construction of all town roads and the maintenance of all county and town roads of the town. He may appoint one or more assistants, subject to the approval of the town board. The compensation of the road overseer and his assistants is fixed by the town board, but must not exceed $3 per day for the time actually spent in the performance of their duties.

The establishment, alteration and vacation of a town road is initiated upon petition of not less than eight voters of the town who own or occupy real estate within three miles of the road to be established, altered or vacated. If the petition is granted after a hearing in which protests from those residents interested may be presented, surveys are ordered and damages and benefits are adjusted by the town board.

Extraordinary improvements of roads, including hard surfacing, which shall incur an expense greater than the amount the town or county is authorized to make appropriation for, are initiated by petition by 15 or more voters of the town who own real estate therein. The proposition is submitted to the voters of the town at the annual town meeting, or if so requested, at a special town meeting, and if 60 per cent. of the voters favor it, the improvement is authorized. The town boards have power to issue bonds to pay the cost of such improvement. Such bonds must not be of an amount, which, together with all other outstanding indebtedness, exceeds 5 per cent. of the assessed valuation of the town.

Any persons who consider themselves aggrieved by any determination of a county or town board in the matter of establishing, altering or discontinuing, or refusing to establish, alter or discontinue any public road, or by any award of damages which may be made by the town or county boards, may appeal to the district court of the county in which he resides, and the court is empowered to adjudicate the affair.

The law includes general provisions concerning the use of roads. One of the rules laid down is to the effect that extra planking must be placed on bridges or culverts before crossing with a traction engine.

The toll rates over bridges across the Minnesota River are determined by the law as follows: For each foot passenger or bicycle rider, 5 cts.; for each hog, sheep or calf, 2 cts.; for each head of cattle, 5cts.; for each one-horse vehicle, 20 cts.; for each additional animal, 5 cts.; for each automobile, 20 cts., and for any other vehicle or animal a reasonable rate of toll.

Missouri

Several new laws governing or affecting highway administration in Missouri have been passed by the Legislature of that state, and approved by the Governor. Summaries of the more important of these new highway laws are given in the following paragraphs.

On March 22 the Governor approved a measure creating a State Highway Department "for the purpose of affording instruction, assistance and cooperation between the state and the counties in the improvement, maintenance and repair of public roads." The law authorizes the Governor with the consent of the Senate, to appoint a State Highway Commissioner for a term of four years at a salary of $3,000 per year. He must be a competent civil or highway engineer or be experienced in highway construction and maintenance. He is authorized, with the approval of the Governor, to appoint one Deputy Highway Commissioner, who must be a civil or highway engineer and whose duties are subject to the direction of the State Highway Commissioner. His term of office extends during the pleasure of the commissioner and his salary is $2,000 per year, with an allowance for his traveling and other expenses.

The duties of the State Highway Commissioner are to collect data on the construction and maintenance of public roads; devise plans, specifications and systems of public roads best suited to the needs of the various counties of the state, and to etablish certain roads with the consent and assistance of county courts and county highway engineers, prescribing the width of the roadbed and the grade. He is also authorized to disseminate information pertaining to the construction and improvement of highways and to visit counties throughout the state and address meetings when requested.

On March 27 the Governor approved a measure repealing several sections of the state laws pertaining to township organization in the matter of roads, highways and bridges. This law authorizes the township boards in the several counties operating under township organization to levy for road purposes a poll tax of not less than $3 nor more than $6 upon every able-bodied male inhabitant in the various road districts in the township, between the ages of 21 and 50 years, except persons residing within incorporated cities, towns or villages. This tax may be paid either in money or labor. If paid in labor it is at the rate of 15 cts. per hour for a man and 30 cts. per hour for a man and team. The taxes, whether in labor or money, are collected by the district road overseer.

A measure approved March 25 provides that the county courts of all counties having a population of less than 75,000, except those under township organization, shall levy for road purposes a poll tax of not less than $2 nor more than $6 upon every able-bodied male inhabitant of the county, between the ages of 21 and 50 years, except persons residing within incorporated towns, cities or villages. The tax may be paid either in money or in labor, labor being rated at 15 cts. per hour for a man and 30 cts. per hour for a man and team. In counties having 75,000 or more inhabitants, the levying of poll taxes is discretionary with the county court.

On March 25 the Governor approved a measure providing for the organization of special road districts in counties operating under township organization. This law provides that any township board in a county operating under a township organization may organize its respective township, in whole or in part, into a road district or road districts; and every district thus organized is vested with the usual powers of a corporation for public purposes. These districts must contain at least 640 acres of land, and if laid out along any thoroughfare may be of any length deemed necessary and advisable.

These districts are initiated upon petitions by the owners of a majority of the acres of land within the proposed district. The petitions are filed with the clerk of the township board, and notice is published in some weekly paper of the township, notifying all owners of land in the proposed district who may desire to oppose the petition, to appear on the first day of the regular meeting of the township board and file written remonstrance. The board is allowed to make such changes as in its opinion best suit the needs of a majority of the land owners within the proposed district. If it shall appear to the board that a majority have given their consent in writing to the establishment of the proposed district, the organization of such district is ordered.

The board is authorized to appoint three commissioners who must be owners of land within the district to serve until the first Tuesday after the first Monday in January after their appointment. On that day the landowners in the district are required to elect three commissioners, one of whom shall serve for one year, one for two years, and one for three years, and on the first Tuesday after the first Monday in January of each year thereafter they are required to elect one commissioner for a term of three years to take the place of the one whose term is about to expire. The commissioners thus qualified are authorized to elect one of their number president, and another vice president. The third may be elected secretary, or by unanimous consent, any person not a member of the board may be made secretary. The township treasurer is ex-officio treasurer of the board.

The commissioners have general charge over the roads within the districts over which they have jurisdiction, fix valuations of land within the district, and determine the assessments levied on the various lands throughout the district, for payments for road improvement. Charges are made in proportion to valuation fixed thereon by the commissioners, and on the basis of the distance at which the lands are located from the roads to be improved. Each tract within one mile of any road to be improved is to be charged according to its full valuation; each tract at a greater distance than one mile and less than two miles is to be charged at 75 per cent. of its valuation, and each tract at a greater distance than two miles at 50 per cent of its valuation.

Meetings of landowners are called, at which time commissioners submit reports containing estimates of cost of construction of proposed roads. The land owners are required to vote on the question of whether any roads mentioned in the plans and estimates shall be constructed or improved according to the plans, to decide what material is to be used in constructing or improving the roads, and when the cost shall be paid, whether at once or within a term of years not to exceed twenty, to be fixed by the landowners. Every landowner is entitled to as many votes on the proposition as the number of acres of land he owns in the district.

In the matter of determining whether or not the roads mentioned in the plans and estimates shall be improved a vote of the owners of a majority of the acres of land in the district is necessary; for the determination of what material is to be used and whether the cost shall be paid at once or within a term of years, and also the term itself, the vote of a majority of acres of land represented by owners present and voting is necessary.

When the improvement of roads has been determined upon in this manner, a report to that effect is filed with the clerk fo the township board, and from the date of the filing of the report, the district becomes a political division of the state for governmental purposes.

After the establishment of a road district the board of commissioners is required to notify the State Highway Commissioner, who must cause to be drawn up plans and specifications for the roads to be improved. It is the duty of the State Highway Commissioner, if possible, to send a competent engineer and road builder for the construction or improvement of the road or roads mentioned in the report of the commissioners. If it is impossible for the Commissioner to send such an engineer, the board of commissioners may employ an engineer to perform the duties as outlined. The work of construction is done by contract, following competitive bidding.

If, at the general meeting of landowners it shall have been decided that the entire cost of the work shall be paid at once, special tax bills are issued against the land in the district and turned over as payment to the contractors. These tax bills are in proportion to the valuation and distance from the roads to be improved as previously outlined, and bills must be paid by the property owners within 60 days from date of issue.

When it is decided at the general meeting of landowners that the cost of road improvements shall be paid in installments within a term of years, the board is authorized to issue bonds of the road district for the length of time decided upon at the meeting, and in an amount not to exceed the estimates submitted at the meeting plus 10 per cent. thereof. The commissioners may then enter into a contract for the construction of the roads, and the payment for the work shall be made in money instead of special tax bills. Bonds are to bear interest at a rate not to exceed 6 per cent. Liquidation of the bonds and interest is made by apportionment to each tract of land in the manner prescribed above.

Subsequent improvements in the road districts are secured in the same general manner as those mentioned in the original report at the time of the organization of the district.

The commissioners have authority to employ a county surveyor and bridge commissioner, or civil engineer to furnish estimates of the cost of construction and improvement of any permanent road. The township treasurer or trustee is authorized to set aside to the credit of road districts the portion of revenue for work on the public roads which may be raised by direct taxation against property lying therein, and such revenue may be spent by the board of commissioners for keeping in repair the roads in the district, or for any other needed work. Poll taxes in road districts are payable in cash and placed to the credit of the road districts.

An act approved March 25 provides that in counties where special road districts have been organized all money collected within the special road districts, as county taxes for road purposes upon property, shall be set aside to the credit of the district and also that 50 per cent of the amount collected for licenses for saloons and for pool and billiard tables shall be turned over to the commissioners of that district.

An act approved March 25 provides that the county courts in the several counties of the state shall, at the May term thereof in each year, levy upon all real and personal property made taxable by law, outside of incorporated cities, towns and villages, a tax of not more than 20 cts. nor less than 10 cts. on each one hundred dollar valuation, as a road tax, which shall be placed to the credit of the road district in which it was collected.

Another act approved March 25 provides that in all counties of Missouri having a population of more than 80,000 and not more than 150,000 in which circuit court is held in more than one place, the county court at the April term of each year, shall divide taxes arising from the special road and bridge tax into two funds, known as the road fund and bridge fund, placing in the road fund not less than 75 per cent of the amount of taxes. The funds shall be immediately available for the construction of roads and bridges respectively. The road fund shall be divided among the road districts and special road districts in the county, giving to each its proportion of the amount paid by its taxpayers.

A measure approved March 26 provides that county courts in all counties which contain 75,000 inhabitants or more shall have the power to require the building of sidewalks along any street, road or highway in any incorporated village or residence district by and at the expense of the owners of lots fronting on such thoroughfare whenever a petition therefor signed by a majority of the owners resident on such streets shall be filed with the county court.

An act was approved April 1, providing for a system of dragged roads to connect all county seats in the state in one general system and appropriating money therefor. In order to carry out the provisions of the act a county highway board is created in each county in the state. This board consists of three members appointed by the county courts for terms of two years. The members of the board are required to serve without compensation. If the county has a county highway engineer he is ex-officio a member of the board. This county highway board and the state highway engineer are directed to select the most practical road to be dragged from the county seat to the county seats of each adjoining county. The State Highway Engineer is directed to certify to the State Auditor the number of miles of such highways in each county. It is the duty of the county highway board to award contracts for the dragging of the county seat highway in each county. A proviso is included to the effect that in any county where it is impossible to drag such road, the amount equal to the cost of dragging shall be expended in the improvement of the roads. The sum of $15 per mile per annum is appropriated from the general state road fund for the purpose of dragging these county seat roads. The county board is authorized to pay not more than 70 cts. per mile for each dragging with a standard 4-horse drag, not less than 8 ft. long. Expenditures for dragging roads must not exceed two-thirds of the annual appropriation per mile in any six months. In counties having a population of more than 75,000 the county board consists of three members of the county court. In counties bordering on the state line the most practical road from the county seat to the state line shall be selected with a view of connecting with the county seat or other city in the border county of the adjoining state.

Contracts have been awarded by the Board of Trustees of road district No. 1 of Phoenix, Ariz., calling for the paving of 9¼ miles of road extending from the Central Avenue bridge to the Arizona Canal. One section of the road will be paved with bitulithic on a 4-in. concrete base and the remaining portion will be resurfaced with heavy asphaltum oil and crushed rock.

It is estimated that the damage done to bridges and roads by the March flood in Athens County, O., amounts to $40,000.

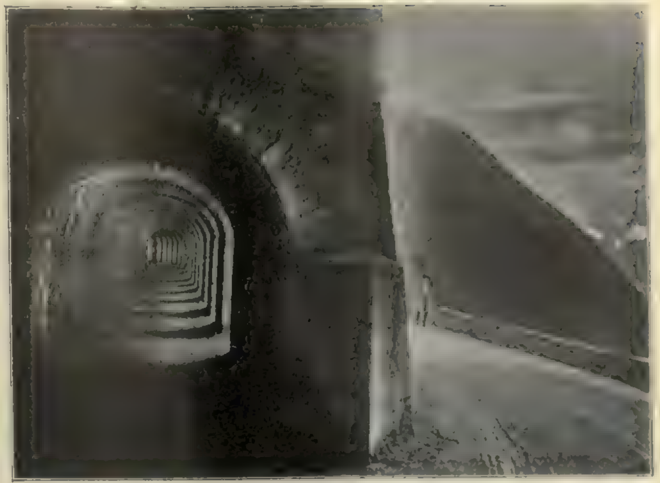
The Simplon Road from Switzerland to Italy

By FRANK P. McKIBBEN, M. Am. Soc. C. E.*

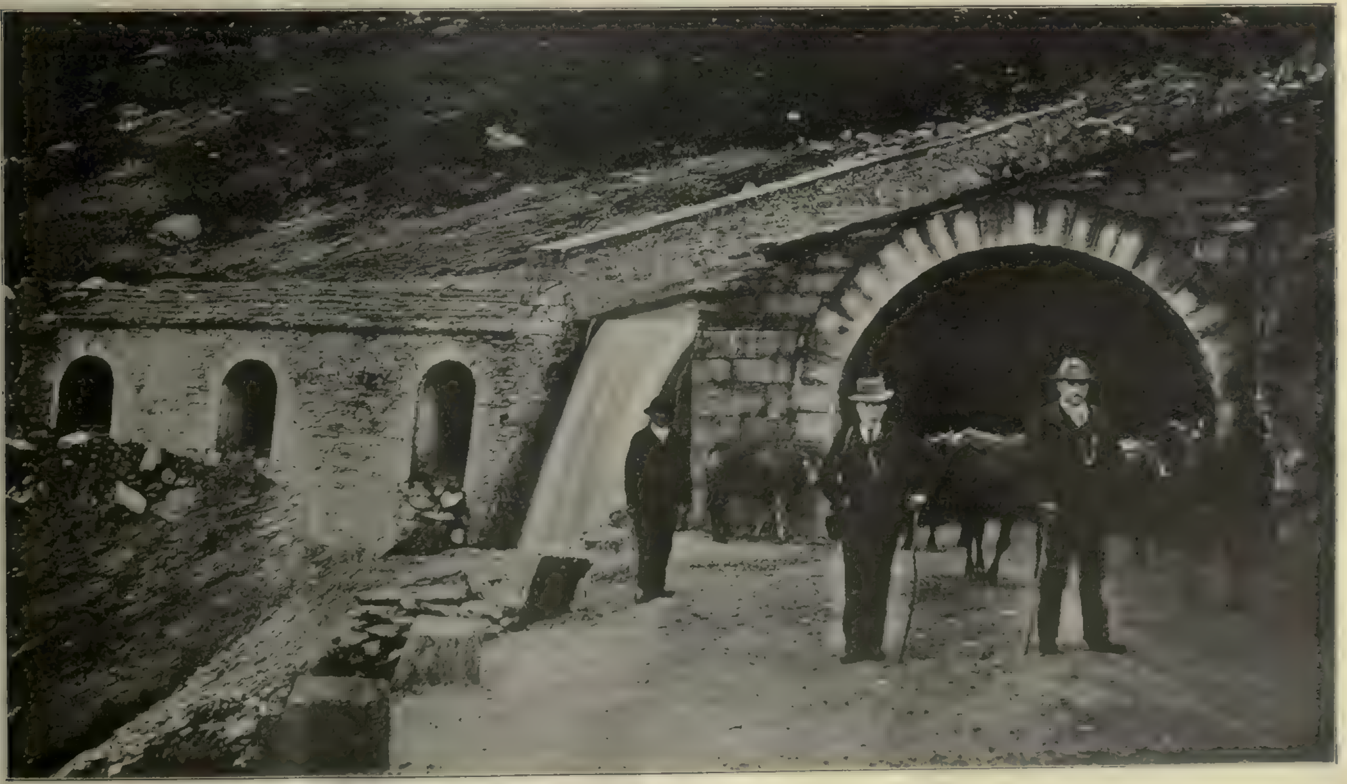
Within a week after driving over the Grand Corniche, that wonderful highway from Nice to Mentone in southeastern France, it is my good fortune to pass over the Simplon Road from Brigue, Switzerland, to Iselle, Italy. Both roads were built by order of Napoleon I and both are remarkable examples of highway construction and maintenance in mountainous countries. But the Simplon Road arouses greater admiration in the engineer because of its many interesting auxiliary works necessitated by heavy snows and rains. The drainage problems in Swiss road construction are many and varied as compared with those of the French Riviera where the precipitation is comparatively small.

The Simplon Road was built between the years 1800 and 1806 during the great military campaigns of Napoleon I. But previous to that for nearly two centuries traffic had been carried on over the Simplon Pass, because Kaspar Stockalper, who in 1642 built the interesting Stockalper Chateau now used by his direct descendants here in Brigue, dominated traffic over an old route which existed approximately on the line of the present road. As a route for through traffic between Italy and Switzerland the importance of the Simplon Road was lost when the Simplon railway tunnel was built through the Alps, but as a road for local use by peasants and tourists it is of great value. It is said that in crossing the Alps by this highway about 10,000 persons annually visit the hospice at Simplon Pass, 6,560 ft. above sea. This hospice was founded by Napoleon I but was not completed till 1831, when it was acquired by the hospice of the Great St. Bernard. At these institutions needy travelers are boarded and lodged gratuitously, but all who can pay for the hospitality afforded by the self-sacrificing fraternity that maintains these places of refuge should do so.

A study of the Simplon Road shows that it is admirably located and that it is splendidly constructed with nearly uniform grades. To the excellent drainage system is due the permanency of the road, and aside from this the novel features that attract one's attention are the Water Gallery, the Winter Gallery and several interesting pieces of construction in tunnels necessitated either to protect the road from snow or to preserve proper alignment and grade. The Water Gallery is an arched covering over the roadway, so arranged that a stream, which descends from the Kaltwasser Glacier above, passes over the gallery instead of underneath as is usual in ordinary culvert construction. The Winter Gallery is also an arched masonry passage used by traffic during a portion of the year at a place where the road would be blocked by snow were it not thus covered. Alongside of this Winter Gallery is the open highway for use in summer. Both galleries, the Water and the Winter, as well as several others, have arched openings in the outer, that is the downhill, side to admit light and air. I passed over the road on June 6, and in many places near Simplon Pass snow and ice covered as much as one-half the width of the roadway; in some places to a depth of 4 or 5 ft. Some



PORTION OF SIMPLON ROAD—SHOWING WINTER GALLERY AND OPEN ROAD FOR SUMMER USE.



SECTION OF THE SIMPLON ROAD ACROSS THE ALPS—SHOWING THE WATER GALLERY.

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*Professor of Civil Engineering, Lehigh University, South Bethlehem, Pa.

INTERIOR OF GALLERY FOR PROTECTING ROAD FROM ICE AND SNOW—SIMPLON ROAD.

of the tunnels and galleries were quite dry, while the roofs of others leaked and the roadways therein were somewhat muddy. However, with the exception of one or two short galleries the roadway was in excellent condition and the drainage system was remarkably effective. This is not the place to dwell on the scenic beauties of the Alps, but one cannot drive over the Simplon Pass without dealing in adjectives of approval.

From Brigue to Iselle is 29 miles and the Swiss diligences carrying passengers, mails, parcel post and baggage to a limited extent, require nearly 9 hours to traverse the route including an hour for lunch and several stops at post stations. These sedate mail coaches are very comfortable; the system is well managed and well patronized. The time just given seems unduly long but it must not be forgotten that in passing from Brigue to Iselle the coach starts at an elevation of 2,245 ft. above the sea, reaches a maximum altitude of 6,582 ft., and descends again to 2,155 ft. One buys his ticket at the post office in advance and is then assured of a seat. The fare for the 26 miles over the Pass is 11.80 francs or about $2.30, which for a day's drive over a fine piece of engineering construction through some of the most beautiful mountain scenery is not excessive. It is from Brigue to Iselle that one of the two parallel tubes of the Simplon railway tunnel, 12¼ miles in length, was constructed between 1898 and 1906 at a cost of about $14,700,000. The second tube is now being driven.

A Toughness Test for Bituminous Materials

A method used in the laboratory of the New York State Department of Highways for testing the toughness of bituminous materials is described in a paper by J. E. Myers, Chemist of the department, presented before Section D of the American Association for the Advancement of Science at the Cleveland meeting.

The first part of Mr. Myers' paper deals with experiences with bituminous materials of various kinds on New York state roads. Observations made in this work finally led to the examination of these materials for that quality opposed to brittleness and designated by Mr. Myers as "toughness." Various methods of testing for this characteristic were tried, and the one which is described by Mr. Myers was finally adopted.

In this test, the material is heated and while in a melted condition is poured into a 3-oz. tin box, 3.5 cm. deep by 5.5 cm. in diameter, the box being filled and the material allowed to cool to room temperature. The box is then held over a Bunsen burner and heated just sufficiently to free the material from the box so that it may be emptied into a pan of cold water. When in this condition the material is still solid, being softened only on the surface, and by wetting the hands the cylindrical piece of asphalt may be rolled into a ball about 5 cm. in diameter. Enough of these balls having been prepared, they are placed in finely cracked ice and water for one hour, and are then broken in an impact machine.

The machine used consists, essentially, of an anvil weighing 50 kg. and a hammer weighing 2 kg., which drops on an intervening plunger having a weight of 1 kg. The lower surface of this plunger is hemispherical in shape, having a radius of 1 cm., and the construction of the machine allows the hammer to fall through any height from 1 cm. to 70 cm. The ball to be tested is placed on the anvil in a small tin box containing cracked ice and water to maintain the material at the desired temperature. A patch of linen, about 1 in. square, is placed on top of the ball, and the plunger brought down to a bearing on top of this. The hammer of the machine is then allowed to drop upon the plunger until the ball is broken, the first blow being through a height of 5 cm. and each succeeding blow through a height 5 cm. greater than the preceding. The height of the last blow is taken as the measure of the toughness of the material.

The following table shows a series of values obtained by this test:

Brand.	No. of Tests.	Toughness Average.	Toughness Maximum.	Toughness Minimum.
A	30	45	65	35
B	35	40	45	25
C	17	25	35	20
D	35	45	60	40
E	50	20	25	15
F	20	35	45	20
G	5	40	45	30
H	12	5	10	5

The figures in the table, according to the paper, are from laboratory tests made on separate samples taken at various times from each brand of material, and are typical of the results which are obtained.

Basing his conclusions upon about 2,000 tests made on material used in the construction of approximately 1,400 miles of asphalt bound macadam roads which have been in use for from one to four years, Mr. Myers explains the interpretation to be made of the results of this test as follows:

"First. Any asphalt which has a toughness test of less than 15 at 0° C. as determined by the tests described in this paper is not safe to use as a binder, especially where the penetration or grouting method of applying the asphalt is used.

"Second. A material which has a toughness of 15 to 25 at 0° C. does not have a large factor of safety in regard to toughness, but will not give trouble because of brittleness unless the roads are built late in the fall and therefore not thoroughly consolidated under traffic before freezing weather sets in.

"Third. Any asphalt which has a toughness of 25 or more at 0° C. will not give trouble because of brittleness under any ordinary conditions to which the road will be subjected."

Congressional Road Committee Named

The following members of Congress have been appointed a committee to pass upon all matters pertaining to highways which come before the House of Representatives:

Dorsey W. Shackleford of Missouri, Chairman; Edward W. Saunders, Virginia; Henry A. Barnhart, Indiana; James S. Davenport, Oklahoma; James F. Byrnes, South Carolina; Hubert D. Stephens, Mississippi; John J. Whitacre, Ohio; Robert L. Doughton, North Carolina; John R. Connelly, Kansas; Edward Keating, Colorado; Clyde H. Tavenner, Illinois; Peter G. Ten Eyck, New York; James B. Aswell, Louisiana; Frank L. Dershem, Pennsylvania; C. Bascom Slemp, Virginia; S. F. Prouty, Iowa; Thomas B. Dunn, New York; Howard Sutherland, West Virginia; Milton W. Shreve, Pennsylvania; Edward E. Browne, Wisconsin and Roy O. Woodruff, Michigan.

Planning of Systems of Streets and Roads*

By NELSON P. LEWIS, M. Am. Soc. C. E.†

In discussing the first question, relating to the "Planning of New Streets and Roads," the writer will confine himself generally to the conditions which exist in the United States and the problems there presented, although it will be necessary to lay down some principles of general application and to discuss some questions which are fundamental. "New Streets and Roads" will also be construed as including the new portions of existing roads which may be necessary for the improvement of their alignment and grade.

The keen interest which has recently developed in the subject of better roads has been confined largely to problems connected with the improvement and maintenance of highways as they already exist. It is quite natural that this should have been the case. Among the oldest institutions of civilized countries are their highways. Their origin was due to the necessity of traveling and moving materials from one point to another not far distant, usually between farm and market, or between adjacent communities or centers of population. The distances traversed were short, the speed was slow, the methods of transportation were crude, and the total amount of movement was slight. As each additional center of population developed it was connected with the nearest similar center and thus with other centers through already existing roads. Towns separated by considerable distances were connected with each other by means of the series of local connections, and rarely were direct routes provided between widely separated towns, except in a few cases where the shortest practicable roads between distant points were laid out and constructed for military purposes. In the United States, where centers of population were early established at points remote from each other, such centers were connected by roads which have since developed into important and reasonably direct arteries of traffic, such as those connecting New York with Boston, Albany and Philadelphia. The distances covered by these three roads were, respectively, about 230, 150 and 100 miles, or 370, 240 and 160 kilometers. Transcontinental trails followed by those seeking homes in newly developing parts of the country have in comparatively few years become long, direct highways, but important and populous cities which have grown up far from the lines of these trails have not been connected with each other by direct roads.

The original highways, whether long or short, were seldom actually constructed; they merely grew; the way was often cleared through forest, but there was little grading, very slight attempt at drainage, and little more than the native soil in the way of road surface. The tractive force required in proportion to the load was very great, and the gradients were necessarily light. These moderate gradients were not secured by cutting down the hills and filling up the valleys, but by detours, short or long, as the topography required. While new roads have been laid out, they have been made branches from or extensions of these old roads, and surprisingly little has been done toward the rectification of the lines or the betterment of the gradients of what have become trunk highways. The distance traversed by the individual vehicle in a single trip was slight, rarely exceeding 20 miles, or 32 kilometers, while the average distance covered was probably not more than half as great.

Since the introduction of self-propelled vehicles, with their greatly increased radius of action, the loss of time, energy and money caused by lack of directness in highways has been more apparent, and it is obvious that any intelligent plan for the improvement and extension of an existing system of roads or the development of a new system must include the correction of alignment in existing roads and provision for direct routes between important centers. The degree of directness which is practicable will depend upon the gradients, which are controlled by the topography, and upon the desirability of slight departures from a generally direct course between focal points in order to give subordinate centers convenient access to the main arteries. If such departures would result in a considerable increase of distance, it is better to provide for the traffic and travel originating in small towns or villages by branch roads of a less expensive character. A rectilinear highway system is not desirable, even if it could be secured without heavy gradients or increased cost. Such roads lack interest, while they encourage excessive speed, which involves a certain degree of danger even on straight roads, and is highly destructive of the road surface. Gradients, however, are not as objectionable to motor vehicles as they are to those drawn by horses, especially if they are short. The reserve power of the motor being far greater than that of the horse, gradients that would formerly have involved slow and tedious climbing and great exhaustion to horses, are overcome by motors with little slackening of speed.

A plan of the state roads of New York (Fig. 1) indicates quite clearly how such a system has been created from the local roads which grew up as the country was settled. The state has a varied topography. The easterly portion is hilly and rugged, with considerable areas which are mountainous and sparsely settled. It was natural, therefore, that the first road of considerable length should have followed the valley of the Hudson River from New York to Albany, these being centers about which the earliest settlements were grouped, and that it should then turn westwardly toward the Great Lakes. This has naturally become one of the most important trunk lines, but aside from this the plan, which includes only the highways designated by law as state roads, to be improved with state funds, does not indicate that a few direct lines traversing the state in different directions formed the basis of the system. It appears that an attempt was made to impartially distribute the improvements among the several counties, rather than to create a great system of state highways. The plan was to a large degree controlled by the topography, yet it is probable that here, as in other states, an equitable distribution of the funds was believed to be of paramount importance.

Another illustration given is the road system of Montgomery County, O. (Fig. 2). The topography in this case is such that the roads can be located almost at will. The county contains one important manufacturing city, from which a limited number of highways radiate. The surrounding country is agricultural, and there is a marked tendency towards a rectangular system of roads. These will, it is true, afford access to the farms and villages, but they do not provide direct routes by which produce can be carried to markets or transportation lines, while through traffic or travel is not accommodated unless it would naturally move in the direction of the rectangular roads.

The location of interurban tramway lines along some of the important roads, a practice subsequently referred to, is

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*Paper presented at the Third International Road Congress, London, England, June 23-28, 1913. Section I, Construction and Maintenance; Question 1, Planning of New Streets and Roads.

†Chief Engineer, Board of Estimate and Apportionment, New York, N. Y.; Past President, American Road Builders' Association.

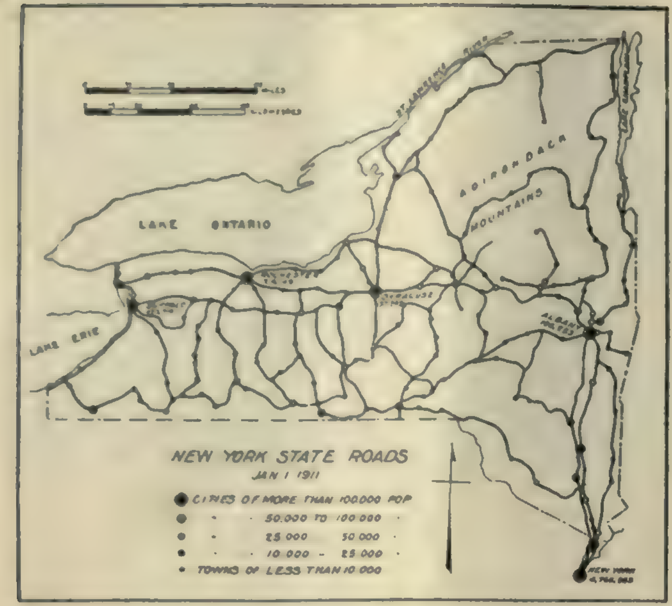


FIGURE 1.

also indicated on the plan. It must be remembered that this plan shows all the roads of the county, most of which are unimproved. This part of the country, while prosperous and rapidly developing, is still relatively new, and the system of state highways which will ultimately be developed may be very different. The rectangular plan in some prairie states and counties is much more conspicuous than is shown in the illustration.

In any system of highways there must be certain focal points of varying importance. Traffic increases as such points are approached, and hence the capacity of the roads must increase in like proportion. The gradients of main thoroughfares should be made as light as possible, both for the reason that loads are heavier and that lighter gradients permit higher speed and therefore greater capacity. Present centers will increase in importance, but not in the same ratio. What is today a subordinate center may in another decade be of relatively greater importance, and the highways approaching it may have to be widened and improved in alignment; hence it is important to give careful consideration to the location and the width of each particular road of the system in order that the cost of such future improvement may be minimized.

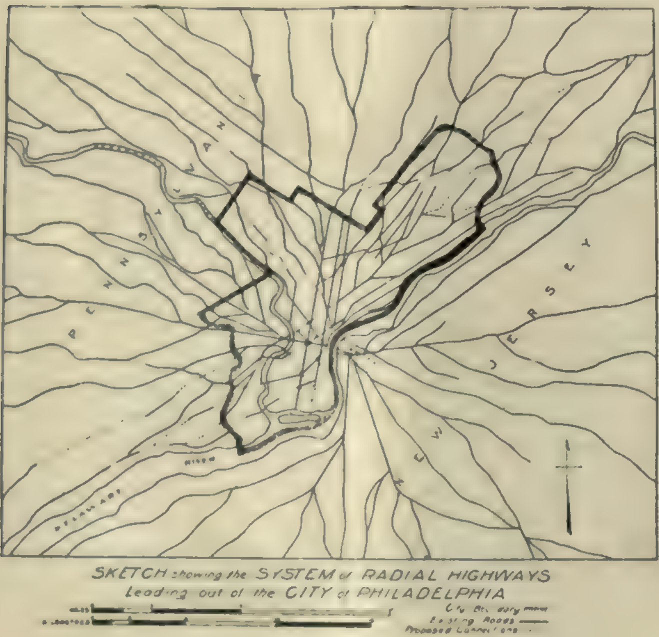

PENNSYLVANIA
NEW JERSEY
DELAWARE
RIVER
SKETCH showing the SYSTEM of RADIAL HIGHWAYS
Leading out of the CITY of PHILADELPHIA
City Boundary
Existing Roads
Proposed Connections

FIGURE 3.

The principles which should govern the creation of a system of highways in a city are quite similar to those applying to a state or a country. The city will also have one or more principal traffic centers and a number of subordinate centers. Direct connections between these centers are of prime importance owing to the heavier loads and the lower speeds forced by greater volume of traffic. It is a mistake to treat a city and a contiguous rural system of highways independently of each other. The motor car has placed the city in such close relation with the rural districts surrounding it and with the neighboring towns, and their interdependence has become so great, that the entire system of highways, both rural and urban, must be considered as an entity.

An excellent illustration of the provision of a system of rural highways articulated with the streets of a large city is afforded by the plan of Philadelphia and vicinity (Fig. 3). Most of these roads already exist, although many of them will doubtless require widening. Certain connections are proposed which will make it easy to reach the principal streets of the city from any part of the surrounding country. The provision of the needed diagonal streets in the older parts of the city, which are indicated on the plan, will require time and involve great expense. Philadelphia has suffered from a rigid rectangular street system, imposed upon it by the whim of its founder and not by its topography, but substantial progress is being made in rectifying its defects.

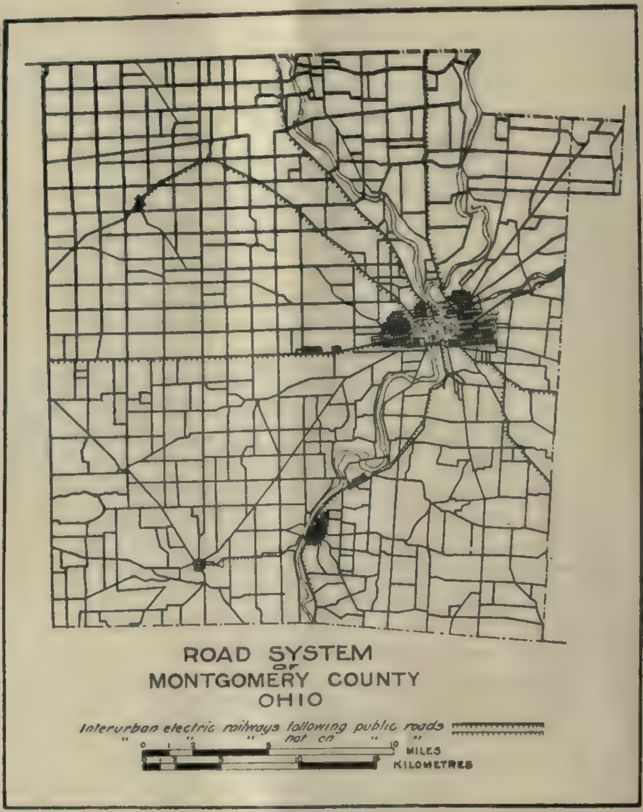


FIGURE 2.

The chief highway connecting two towns should afford a direct connection between the important traffic thoroughfares of each. Frequently this is not the case, but the main and sometimes the only adequate road connecting them leads at either end into narrow, tortuous and shabby streets which must be traversed in order to reach the business and administrative center. How different an impression one will obtain and how largely will the pleasure, comfort and convenience of a journey be increased if the approach to a town is through a dignified, well paved thoroughfare constantly increasing in importance and interest until the climax is reached at a well designed and convenient civic center. It will frequently be necessary to create new and widen existing thoroughfares. As the village grows into a city and the city into a metropolis, such improvements are sometimes imperative. Failure to provide them will prevent or retard the growth of the town, but their cost will often be so great that they will be undertaken with hesitancy. What is commonly called city planning consists in large measure of the correction of blunders made in the original system of highways. Failure on the part of the engineer to exercise some foresight and even imagination in the design of a rational and adequate system of roads is responsible for the incalculable loss caused by an unsuitable street system and the enormous cost of changing it into a proper one in a densely populated city.

The primary function of the street is to provide light, air and access, and accommodation for such amount of traffic as it will be called upon to sustain. In cities many streets are required almost solely for the purpose of affording access to the dwellings fronting upon them. The traffic which they accommodate is often little more than that involved in affording ingress to and egress from the abutting dwellings for those who occupy them and the tradesmen who supply their daily needs. A large proportion of the streets are confined to this restricted use, others accommodate a considerable amount of neighborhood traffic, while through the great thoroughfares there surges the complex business of a metropolis and that which comes to it from the surrounding rural districts.

Land values in cities are so high that the provision of a greater width of street than is actually necessary involves a very serious burden upon the abutting owner both for the acquisition of the land and for surface improvements. To the degree that additional land is taken for streets, the price of the abutting land and its rental value will inevitably increase. It might seem reasonable, therefore, to limit the width of city streets to that which will accommodate vehicles and pedestrians when their movements are so regulated and controlled as to provide a maximum of capacity with such division into roadways and footwalks as to make suitable but not unnecessary provision for both. It is impossible, however, to foresee the changes which may take place in the volume of traffic as the city grows, and future widenings will be very costly. Where the height of buildings and the proportion of the lot which may be built upon are restricted by law, it may be possible to make a fairly accurate estimate of future needs provided these restrictions are maintained. In the United States such limitations of the use to which the abutting owner may put his property are almost unknown. The district which today is devoted exclusively to two-story detached dwellings may, by the provision of good transit facilities, be rapidly converted into a section of compactly built tenements five or six stories in height. They may not produce a great deal of traffic, but the decent requirements of light and air cannot be met if the street is from 30 to 50 ft. in width, which might have been sufficient for the character of buildings originally erected. For these reasons there is a disposition in the City of New York to make 60 ft., about 18.3 m., the minimum street width.

Outside the cities and towns the traffic is less local in character. In agricultural communities the proportion of traffic passing a given point which originates between the two nearest intersecting roads is very small. The benefit on the rural highway is, therefore, less local than is the case in towns, and the alignment, the rate of grade and the width and the character of the road surface are of general public interest and are to be determined by public need rather than by that of the abutting owner. The width of such roads should not be less than 50 ft., and should be increased to 60, 70 or 80 ft. as the roads approach towns. Where radial highways are to be created leading from important cities into the neighboring country or to other towns, it is quite probable that the growth of the city will follow such arteries of travel, and it would be wise to give such roads a width of not less than 100 ft. In most cases the width of the metaled road need not exceed that required for two vehicles to pass, say 16 ft. More than this would be a waste of money until such time as increased traffic required it.

Some of the most attractive and useful highways in the United States are to be found in the main streets of certain of the New England towns, where these main roads were given a generous width, often exceeding 100 ft., and were planted with rows of trees, usually the graceful American elm. These highways, which in some instances connect one town with another, are exceptionally beautiful. In the immediate vicinity of cities, in territory which is likely in the course of time to be added to an adjoining city, and in the portions of a city where the street plan is not yet completed, it is most important that due regard be paid to the probable or even possible requirements of future development. Such a district will, in almost every instance, have a number of small centers of population connected by fairly direct roads. These will naturally become main arteries of traffic when the greater city shall have so expanded as to absorb them. To so widen and improve their alignment as to fit them to perform this function will involve little expense at the present time. If it is deferred the cost may become so great as to be prohibitive, the natural and orderly development of this new part of the city will be impossible, and future generations will pay dearly in congested traffic and increased cost of business for our present lack of foresight. A city does not, or should not, grow by accretions of fully developed areas; neither should its street plan expand by the addition of one completely platted area after another. Its growth is not like that of the human frame, beginning with a structure complete in every detail and gradually increasing in size. The skeleton should be created first. The position of the various parts of this skeleton will be controlled by the topography and by the crude but suggestive system of roads which has already developed, each of them for a fairly good reason, namely, that it leads where people wish to go. Others who come to these now unimportant centers will doubtless wish to go in the same direction and these roads will naturally become the important streets of this new part of the city. Additional connections will naturally suggest themselves, and the entire street system will, if intelligently controlled, be developed in a rational manner along the lines of least resistance, and this part of the city at least will be adapted to convenient movement, orderly business and wholesome living.

In the creation of radial roads a difficult problem is frequently presented by the small town or village through which such roads would naturally pass. It rarely happens that any of the town or village streets are of sufficient width to provide the needed capacity. Their widening would involve expense which might be prohibitive and would be violently opposed by those who, attracted by the quiet of the village street, have made their homes there and do not wish to see it converted into a busy thoroughfare. In such cases it is usually possible, by a slight detour, to avoid the local street, save the expense of widening and return to the existing road at a convenient point beyond the town. At the same time new impetus will be given to the development and improvement of the land along the new highway, while the character of the older portion of the town will be preserved. This plan of adopting "by-pass roads" is simply following the lines of least resistance and may go far towards overcoming the local opposition which frequently develops when any change is suggested.

Within the limits of cities, where land values are high, where rectangular building lots are favored on account of their availability for more profitable use, and where the speed of vehicles is necessarily slow, the greater part of the streets intersect or cross each other at right angles. The value of diagonal streets affording direct movement between different parts of the city has already been pointed out. A widening of the street area at important intersections greatly facilitates traffic, permits higher speed, and decreases the danger of collision. These desirable objects are not accomplished by simply increasing the open area of the roadways. Such widening, if vehicles are allowed to wander at will across the open space, will result in confusion, rather than order, and will invite accident. The open space can be used to lay down specific routes for vehicles moving in various directions and will afford a better view of approaching vehicles, thus facilitating movement. In the case of rural highways, rectangular intersections or crossings, while very common, are highly objectionable and involve great danger to or from rapidly moving vehicles, especially where hedges, foliage or other obstacles interfere with the view of those approaching such junction points. The land is of such relatively little value that the additional cost of cutting off the corners sufficiently to afford an unobstructed view of the traveled road for at least 150 ft. in either direction would be very slight. Assuming that vehicles traveling in opposite directions occupy the middle of the road, the area required to be thrown into the highways at the corners of a right angle crossing would vary from .15 of an acre in the case of two roads each 50 ft. wide, to .03 of an acre in case they are each 80 ft. wide. On roads of the last named width the volume of traffic and the speed may make it desirable to have unobstructed sight of the traveled road for 200 ft. This would involve the cutting off of a total area of .17 of an acre for the four corners. The acquisition of these areas would only be necessary in cases where there are obstructions such as hedges or trees which would interfere with the view. Where changes in direction occur, they should be by curves, rather than angles, the radius of curvature being sufficient to permit an unobstructed view of the road for at least 300 ft. ahead.

Interurban tramways are being constructed quite generally in the United States, and while in many cases they are placed upon private rights of way where they can maintain high speed, they are sometimes located within the lines of existing highways and even immediately adjoining the metaled roadway. This is a very objectionable practice. The tracks should always be so separated from the space used by vehicles that the drivers of the latter cannot intentionally or otherwise pass from the roadway to the tracks, while the tracks should never be permitted to cross the traveled road at grade. If the public road is not of sufficient width to permit of such complete separation, it should be widened at the expense of the tramway company. Wherever the tracks may be placed, the space occupied by them should be so treated as to prevent nuisance from dust.

In cities the tramways must of necessity occupy the public streets, and the only place for them appears to be the central part of the paved roadway. In no case, however, should tracks be permitted in any street unless there is room for the free passage of at least one line of vehicles between the cars and the curb. The present ordinances of the City of New York prohibit the placing of double track surface lines in a roadway measuring less than 40 ft. between curbs or a single track in a roadway of less than 30 ft.; in cases where the width is between 30 and 40 ft., the return tracks must be placed in another street, so that the movement is always in the same direction. In the cities of the United States there are few motor buses, and cabs are so expensive that they are little used; consequently the most important streets are occupied by surface railroad tracks. While they are a serious obstacle to vehicular traffic, they are indispensable. The cars are very heavy, and the tracks, however substantially built, need frequent repair, and the satisfactory maintenance of the pavement between and along them presents serious difficulties. If the streets were sufficiently wide, the best solution of the problem would be to place the tramway tracks in spaces entirely separate from the vehicular roadways, provided the spaces so occupied could be maintained in a satisfactory manner. This plan has been followed in a few cases, and is the prevailing practice in New Orleans, where an attempt is made to maintain grass in the spaces so occupied, but with indifferent success, and the appearance of the street is likely to be less attractive than where the tracks occupy the central part of the roadway, provided the pavement is of a suitable character and is well maintained. It is successfully done in certain European cities, a notable instance being that of Bismark Strasse, Charlottenburg. Where such street railway lines are built and operated by corporations, the franchises sought will be in streets where the traffic is already intense and where the immediate returns will be large. Such traffic is rarely found in the streets which are broad enough to permit of roadway subdivision by the introduction of spaces in which tracks could be placed, so that the present plan of using the central part of the paved roadway will doubtless continue. In the United States the tramways are owned and operated by corporations which have secured franchises permitting them to use certain streets for this purpose. The franchises are generally perpetual, and in many cases do not contain adequate provisions for the maintenance of the pavements. The recent policy has been to restrict franchises to a limited period of from 25 to 50 years.

Where there is a great volume of travel consisting of a large number of vehicles moving generally at good speed, and where the roadway space is sufficient to permit, the movement of vehicles may be controlled by the introduction of a series of isles of safety or other longitudinal subdivision. There is a difference of opinion as to the effect of this arrangement upon the capacity of the highway. If all of the vehicles in a roadway are moving in the same direction, its capacity will be increased, and two roadways in the same street, in one of which the movement is all in one direction, and in the other all in the opposite direction, will have a greater total capacity than a single roadway of the combined width where vehicles moving in opposite directions can interfere with each other. This is certainly the case if the volume of travel in each direction is approximately equal, as would be likely in a street connecting important centers. If, however, there is a great preponderance of travel in one direction during a portion of the day which is reversed a few hours later, there may be an excess of capacity in one roadway and a deficiency in the other which might be avoided if there were one broad carriageway, two-thirds of which might be occupied by vehicles moving in the direction of heavier travel. Yet the greater orderliness of movement and its effective control lead the writer to believe that such a subdivision of broad streets is advantageous. There are so many instances of the subdivision of very wide streets in the capitals of Europe, and the treatment has been so varied that no instances of such treatment in the United States are recalled which are worthy of special mention. In general, there is a single roadway of generous width, centrally located, for the use of rapidly moving vehicles, with service roadways from 25 to 30 ft. in width on each side, these being separated from the central roadway by parked spaces and promenades. Where there are surface railway tracks, it is considered better to place them one in each of the service or side roadways and adjacent to the parked areas. There was formerly a disposition to set aside a certain portion of such streets for the accommodation of bicyclists, but their number has so greatly decreased of late that the provision of a special space for them is no longer warranted. They are classed as vehicles, and motorcycles can readily use the same roadway as motor cars, while those driven by the riders will find the service roadways adequate and safe.

The most economical and advantageous division of the street into roadways and sidewalks is a difficult problem, owing to the change which is taking place in the width of vehicles. Provision should be made for two or more lines of vehicles moving in each direction. More than this is a waste of space and involves needless expense for pavement. Eight feet should suffice for a moving line of ordinary vehicles, but the width of motor trucks has greatly increased of late, and if a roadway designed for four lines of travel, two in each direction, can accommodate but three, its capacity is reduced nearly one-half, as the third or central space cannot be used by vehicles moving in both directions without great confusion and danger. Similarly, if a roadway designed for six lines of vehicles, three in each direction, can accommodate only five, the fifth line will be of almost negligible value, and the roadway capacity will have been reduced a third. To widen the roadway by setting back the curb may involve the loss of space actually needed for pedestrians. The most practicable remedy seems to be the prohibition of the use of vehicles of excessive width. This may be effected indirectly by the imposition of special taxes increasing in geometrical ratio upon all vehicles exceeding a certain width, so that their use will become unprofitable. Coupled with this there should be a similar tax increasing in the same manner upon all vehicles having an average wheel load in excess of a certain fixed amount when loaded to their full capacity. This will discourage and render unprofitable the constantly increasing loads which are braking down pavement foundations. The problem of the pavement and its foundation is beyond the scope of this paper, and the subject is referred to only because the remedy may be found and applied together with that proposed to prevent the curtailment of roadway capacity by the unnecessary and undesirable increase in the width of vehicles.

In the planning of a system of highways there is one consideration usually ignored that should be taken into account, namely, the attractiveness of the route to those who will use it. While the primary function of the road may be to afford facility of movement from place to place, the interest of road users is not limited to the quickest possible arrival at their destination. An increasingly large proportion of them are in search of healthy recreation and pleasure. A road which is monotonous and where the prospect is confined to long stretches of metaled roadway will be avoided except by those whose sole aim is to save time. One which abounds in picturesque vistas and distant outlooks will be much frequented. The avoidance of obstructions to views of attractive objects and the screening of those which are ugly are important elements in road location which should not be ignored, but such effects should not be secured at the expense of dangerously tortuous roads or material increase in distance. This attention to detail should also be extended to the treatment of the roadside. Provision of suitable shade trees, the screening of bare slopes and rough walls by vines and shrubs are worthy of the careful consideration of those in control of highways, although these last named details relate to construction and maintenance, rather than to location.

The most essential considerations which should govern the planning of the individual road or a complete highway system may be briefly summarized as follows:

1. The road, while not monotonously straight, should be as direct as the topography and limiting grades will permit.
2. Trunk lines, articulated with those of an adjoining jurisdiction, should form the basis of a complete road system.
3. Detours from the general direction of trunk lines to reach unimportant towns are not justified; such towns can be served by branch roads.
4. The principal streets of a city should form a part of the trunk system of the territory in which such city is located. Facility of movement between the city and the surrounding country and neighboring towns is essential.
5. The principal highways between neighboring towns should connect directly with their most important and dignified thoroughfares.
6. Roads should increase in width as they approach important towns, so that as the towns grow outward along these roads it will not be necessary to incur great expense in widening them.
7. In establishing adequate roads radiating from important cities it is unnecessary to undertake expensive widenings of the streets of small towns or villages. By-pass roads around them will answer the purpose.
8. At crossings or junctions of rural highways sufficient space should be added to the road to afford a view of approaching vehicles. Curves should be used instead of abrupt deflections. In city streets a widening at important junctions is always desirable.
9. Tramways are inevitable in city streets, and the best location for them is in the middle of the roadway. When they follow rural highways, they should be so separated from the traveled road that vehicles cannot pass from road to tracks, and they should never cross the highway at grade.
10. Roads should be made interesting where possible. Picturesque vistas and extensive outlooks are desirable as well as easy gradients and a smooth surface. The highway should promote health and pleasure, as well as business.

Street Improvement in Helena, Montana

The cost of public improvements, including street and sidewalk construction, sewers and other work, planned for the present season in Helena, Mont., will amount to $363,680. This sum is said to be the largest to be expended in any inland city in the Northwest during the year. When the work is completed the streets of the city will all be improved between the Union Station and Mount Ascension, and from the Capitol Building on the east to the base of Mount Helena on the west.

According to plans prepared by City Engineer Jordan, 420,000 sq. ft. of sidewalks will be constructed, two streets in the business district will be paved, and a large amount of parking will be laid out.

A part of the work is already under contract. In the Breckenbridge district contracts have been awarded for 47,000 sq. ft. of concrete sidewalk and for curbs and crosswalks. Park Ave. from Edwards St. to the Post Office, comprising 3,000 sq. yds., will also be paved. This work is under contract, but is being delayed temporarily by a shortage of paving brick.

Sidewalks having a total area of 20,000 sq. ft. will be laid in the Rodney St. district. The plans include curbing and laying of crosswalks. Improvements in the Broadway district between Rodney St. and the Capitol Building will include 59,000 sq. ft. of sidewalks and the construction of curbs and crosswalks. The Southeast district, which includes Beattie, Chaucer and Raleigh Sts., together with intersections, will be improved by the construction of 89,000 sq. ft. of sidewalks, together with curbs and crosswalks. In what is known as the Sixth Ward district, which includes Boulder, Lyndale, Lewis, Gallatin and intersecting streets, 104,000 sq. ft. of sidewalks will be laid. The plans for this district also include laying curbs and crosswalks.

The largest amount of work will be done in the East Side district, plans for which call for the construction of 146,000 sq. ft. of sidewalk and parking. This district includes all the north and south streets between Davis and Roberts, and lies between the alley north of Broadway and the alley north of 11th Ave. The roadway of Jackson St. will be paved with brick, 5,600 sq. ft. of concrete sidewalk will be constructed and granite curbs will be laid.

New Highway Officials in Arkansas, Iowa and Maine

During the past few months important changes have been made in the highway laws of several of the states. With the establishment of a central highway authority in Arkansas and the reorganization of the departments of Iowa and Maine, new officials have assumed charge of highway affairs in those states, and we print herewith portraits and brief biographical sketches of six of these men.

Arkansas

Reuben G. Dye, Commissioner of the recently created Department of State Lands, Highways, and Improvements of Arkansas, and ex-officio Chairman of the State Highway Commission was born in St. Francis County, Ark., in 1879. He attended the public schools of Forest City, and afterwards the University of Iowa, taking a two-year course in civil engineering.

REUBEN G. DYE, CHAIRMAN OF THE ARKANSAS STATE HIGHWAY COMMISSION.

For eleven years he was employed in the office of the Commission of State Lands, rising from a subordinate clerkship to Deputy Commissioner. In 1910 he was elected Commissioner of State Lands. He assumed the duties of that office on Nov. 1, 1910, and was reelected in 1912. When the department of State Lands was changed by a law approved March 31, 1913, to that of the Department of State Lands, Highways and Improvement, he automatically became the chief executive of that department.

Commissioner Dye is a member of the Arkansas Association of Surveyors and Civil Engineers and the Arkansas Good Roads and Drainage Association.

E. A. Kingsley, the first State Highway Engineer of Arkansas under the new highway law approved March 31, 1913, was born in Indianapolis, Ind.

After completing a course in the public schools of that city he graduated from the civil engineering course at Purdue University, at Lafayette, Ind., in 1893. Immediately after graduation he entered the service of the city of Indianapolis, and in 1895 entered the employ of the Great Northern R. R. at St. Paul. During the next nine years he was engaged in railroad engineering with the Great Northern and the Chicago, Rock Island and Pacific, at Little Rock, and was also connected with the Colorado Fuel and Iron Co. of Denver.

In April, 1904, he was appointed City Engineer of Little Rock, holding that office until his retirement two years ago to engage in private practice. During the past two years he has been consulting engineer for Pulaski County, Ark.

Mr. Kingsley is an associate member of the American Society of Civil Engineers, a member of the American Road Builders' Association, the American Highway Association, the Association for Standardizing Paving Specifications, the Arkansas Association of Surveyors and Civil Engineers, and the American Society of Municipal Improvements. He served as president of the last named society in 1912. He is also a member of the Board of Trade, and the Chamber of Commerce of Little Rock.

E. A. KINGSLEY, STATE HIGHWAY ENGINEER OF ARKANSAS.

Iowa

H. C. Beard, of Mt. Ayr, who was appointed a member of the Iowa State Highway Commission for the short term of two years under the provisions of a recently enacted highway law, was born in Ringgold County, July 26, 1877.

Commissioner Beard has taken an active part in the good roads movement in the state, and was one of the originators of what has come to be known as the Mt. Ayr plan of building dirt roads. Because of his activity along this line Governor Clarke placed him on the commission as the democratic member. Mr. Beard is an attorney with offices at Mt. Ayr and has not previously held public office.

James W. Holden, appointed by Governor Clarke as member of the State Highway Commission for the four-year term, was born in Jackson County, Iowa, Nov. 15, 1862. He moved to Greene County in 1875, after which he spent a few years in Colorado. Returning to Greene County he en-

H. C. BEARD, MEMBER OF THE IOWA STATE HIGHWAY COMMISSION.

JAMES W. HOLDEN, MEMBER OF THE IOWA STATE HIGHWAY COMMISSION.

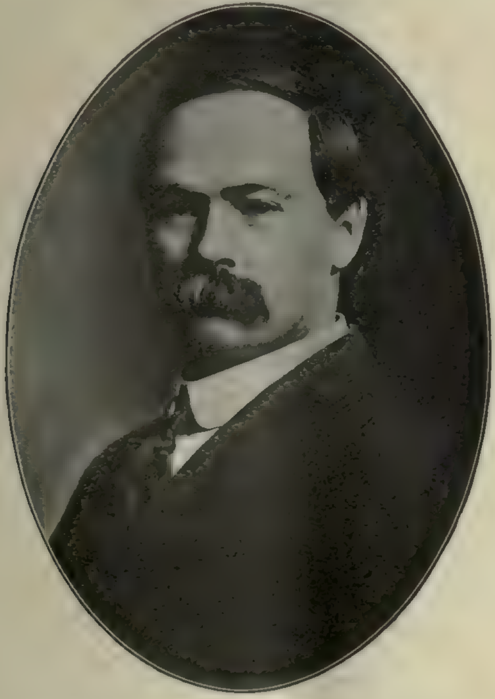
gaged in farming, and became one of the most extensive landowners in that county.

In 1897 he moved to Scranton, Greene County. In the fall of 1906 he was elected a member of the County Board of Supervisors, and held that office for six years.

Anson Marston, Dean of the Division of Engineering and Professor of Civil Engineering at the Iowa State College of Agriculture and Mechanic Arts, ex-officio a member of the Iowa State Highway Commission, was born at Seward, Ill., May 31, 1864.

He received his education in the public schools of Winnebago County, the West Rockford (Ill.) High School, Berea College, and Cornell University, graduating from the civil engineering course of the last named institution in 1885 and receiving the degree of C. E. in 1889.

For two and one-half years after graduation he was engaged in location and construction work on the Missouri Pacific Railroad, as transitman, resident engineer and chief of locating party. On March 1, 1892, he was made Professor of Civil Engineering at the Iowa State College ad in 1898 was appointed College Engineer. In 1904 he became Dean of the Engineering Division and Chief Engineer of the Experimental Station. Since 1904 he has had charge of the road work at the college.



ANSON MARSTON, EX-OFFICIO MEMBER OF THE IOWA STATE HIGHWAY COMMISSION.

LYMAN H. NELSON, CHAIRMAN OF THE MAINE STATE HIGHWAY COMMISSION.

In addition to his college work Prof. Marston has engaged in outside engineering practice, having been employed as consulting engineer for the cities of Cedar Rapids and Des Moines, Ia., in connection with the construction of reinforced concrete bridges.

He is a member of the American Society of Civil Engineers, the Western Society of Civil Engineers, the American Society for Testing Materials, the Society for the Promotion of Engineering Education, the Iowa Engineering Society, and the Iowa Academy of Science.

Maine

Lyman H. Nelson, of Portland, Me., Chairman of the Maine State Highway Commission, which was created by a law recently enacted by the Legislature, was born on May 17, 1857, at Portland, where he has since resided. He is a graduate of the Portland High School, and is a publisher and manufacturer of paper goods, being the head of the L. H. Nelson Co. of Portland.

To the efforts of Mr. Nelson, as a director of the Maine Automobile Association, is largely due the reorganization of the Maine State Highway Department. He was the originator of the plan of capitalizing the automobile tax by which the state was empowered to issue bonds for $2,000,000, to be liquidated from the automobile fees collected during about 23 years, recently made effective by legislative act.

He is a member of the Board of Governors of the Portland Club, and a director of the Portland Board of Trade.

City Planning Recommendations for Jersey City

A report embodying recommendations for the procedure to be followed in the development of the city of Jersey City, New Jersey, has recently been made to the City Plan Commission by E. P. Goodrich, Consulting Engineer of the Borough of Manhattan, and Geo. B. Ford, of the firm of Geo. B. Post & Sons, Architects, New York, N. Y. Messrs. Goodrich and Ford were retained as expert engineers late last year to study the problem with respect to certain items, included in which were the development of the streets by grading, paving, widening and extension; the development of parks, and park systems and connecting boulevards; tree planting in the streets; embellishing bridges and other municipal structures, and various other matters of city planning.

In order to become thoroughly familiar with conditions, the engineers walked through 64 miles of the city's streets, taking careful notes of existing conditions. These notes formed the basis of their report, in which further study of conditions is recommended. The work, as outlined, would include the preparation of "residence" and "place of work" maps, as well as contour and other maps of the city and vicinity.

Among the recommendations made in connection with the physical development of the streets are the relief of congestion by the removal of encroachments from the sidewalk area, by the segregation of various classes of traffic and by the straightening, widening and grading of streets; the fixing of street widths and types of pavements after a careful study of the traffic and other conditions, and the establishment of a regular paving program for the next ten years.

The ideal street system, according to the report, provides for the segregation of traffic by building the main thoroughfares leading from the center of the city to the outlying centers in groups of three—one for the street cars or other rapid transit use, one primarily for heavy trucking and the third for automobile traffic. This, it is stated, can rarely be accomplished in the ideal form, and the nearer it can be approximated the better the ultimate results. Jersey City, it is stated, is better provided with special automobile streets and with streets upon which street cars run only in a single direction than are many neighboring cities. Such streets as these, it is held, should be increased in number, special types of pavement laid to accommodate the different kinds of traffic and certain streets extended in order to provide quicker transit and more direct lines of communication.

At many street intersections in the city the engineers found serious traffic congestion, which they ascribe to too narrow streets, too narrow sidewalks, too roundabout ways of getting from one point to another, unduly steep grades, too many encroachments upon the street and too much interference between street cars and trucks. In many places in the city, they report, these conditions can be relieved by straightening and removing encroachments at small expense.

In regard to the pavements of Jersey City, the report states that there is very little good or suitable pavement in the city and that a great deal of the existing paving is not only unscientifically specified and laid, but is not properly maintained. The condition of the pavements is considered to be largely due to the extensive use of trap for paving blocks, which, it is stated, results in rough and unsightly surfaces in most instances. After reviewing the various conditions determining the types of pavement to be laid in given cases, the report recommends that for the work of the next ten years a regular paving program be established after a careful study of existing and probable future conditions and with due consideration to the matter of economics.

The aesthetic side of street paving construction should receive attention also, according to the recommendations made in the report, by the improvement of the curbs, the construction of cement sidewalks in place of the rough bluestone walks at present laid, and the maintenance of proper crowns. Concrete curbs are recommended for streets where there is little likelihood that heavy vehicles will back against the curbs or grind along them, and granite curbs of widths of not less than 6 ins. are recommended for heavy traffic streets. In connection with the making of the paving program, the drawing of extensive maps showing sidewalk, pavement and substructure conditions, the special study of types of pavements, the investigation of city ordinances governing sidewalk and street construction, the study of traffic costs on different pavements and a tabulation of cost data on paving during past years are recommended.

In the section of the report devoted to financing, considerable attention is given to the methods of paying for street work, and a thorough study of this problem, including an investigation of the methods operative in the city and those which can be applied under the present state laws, is recommended.

The Use of Chats on Missouri Roads

According to statistics compiled by the Missouri Geological Survey, over 2,700,000 tons of chats—mine tailings—have been utilized during the past year for road building, concrete construction and railroad ballast.

The lead and zinc mines in the Flat River and Joplin districts produce very large amounts of this material annually, and the mining companies sell it at $1.00 per car, or less than 10 cts. per ton. In southeastern and southwestern Missouri the tonnage produced is approximately equal, though only about 25 per cent. of that utilized last year was obtained from the mines in the southeastern portion of the state. In 1911 there were used 487,814 tons from southeastern Missouri and 1,015,789 tons from southwestern Missouri, while in 1912 the corresponding figures were 721,212 and 2,002,282. The totals for the two years were 1,503,603 in 1911 and 2,723,403 in 1912, an increase of 80 per cent. in 1912 over 1911.

According to the statement of the Geological Survey, Missouri uses a greater tonnage of chats than any other state in the Union.

AMERICAN ROAD BUILDERS' ASSOCIATION

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Through the courtesy of the publisher of "Good Roads," this page, each month, is devoted to the use of the American Road Builders' Association. It is solely in the interests of the Association, and it is the desire of the Executive Committee that all members feel that this space is their own, and that they contribute freely to it, not only as regards anything concerning the Association itself, but also that which will further the good roads movement. Besides the official announcements of the Association, there will appear on the page contributions by members, items of news concerning the Association's activities and personal notes about its members. All contributions should be sent to the headquarters of the Association, at 150 Nassau Street, New York, N. Y.

Executive Committee:
Geo. W. Tillson
R. A. Meeker
E. L. Powers

The Effect of Grade Upon the Cost of Hauling

The relation between the rate of grade and the power required to haul a given load is well shown in the accompanying diagram, contributed by a member of the Association. The argument made, though not new, is one which is not always borne in mind in planning roads, and is presented perhaps more forcibly by an illustration than by columns of data.

Papers Presented at London by A. R. B. A. Members

In this issue of "Good Roads" there is printed a paper on the planning of highway systems presented at the Third International Road Congress in London last month by Nelson P. Lewis, Chief Engineer of the Board of Estimate and Apportionment of New York City, and Past President of the A. R. B. A.

It will be remembered that the Association was to be represented at London by practically all of its officers and many of its members, and that of the 25 Americans scheduled to present papers, 15 were A. R. B. A. members.

Other members presenting papers at the congress were: Arthur H. Blanchard, Professor of Highway Engineering, Columbia University, New York, N. Y.; Wm. H. Connell, Chief of the Bureau of Highways and Street Cleaning, Philadelphia, Pa.; Major W. W. Crosby, Chief Engineer of the Maryland Geological Survey; Arthur W. Dean, Chief Engineer of the Massachusetts Highway Commission; H. B. Drowne, Instructor in Highway Engineering, Columbia University, New York, N. Y.; Prevost Hubbard, Institute of Industrial Research, Washington, D. C.; A. N. Johnson, State Highway Engineer of Illinois; Logan Waller Page, Director, U. S. Office of Public Roads, Washington, D. C.; Harold Parker, Vice President of the Hassam Paving Co., Worcester, Mass.; John R. Rablin, Chief Engineer of the Metropolitan Park Commission, Boston, Mass.; Clifford Richardson,

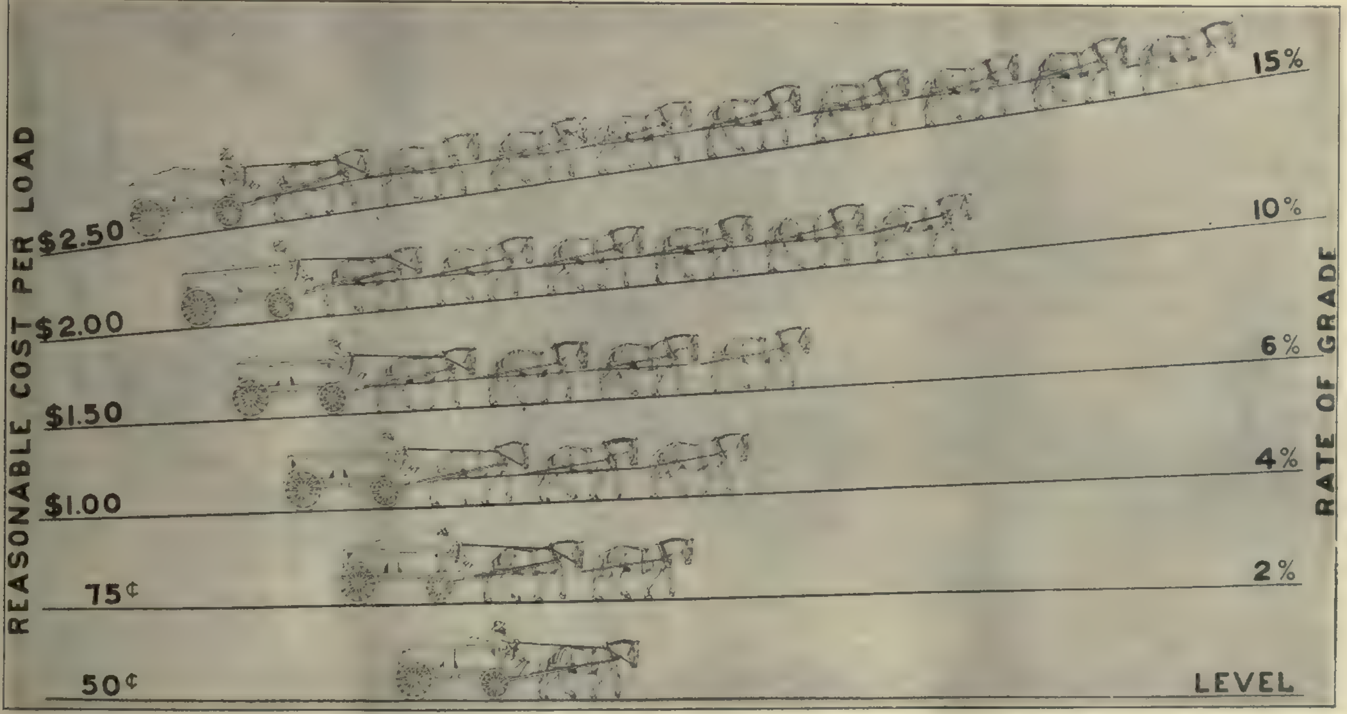

DIAGRAM SHOWING THE EFFECT OF GRADE UPON THE COST OF HAULING.

Consulting Engineer, New York, N. Y.; Paul D. Sargent, Assistant Director, U. S. Office of Public Roads, Washington, D. C.; Geo. W. Tillson, Consulting Engineer to the Borough President of the Borough of Brooklyn, New York, N. Y., and J. C. Travilla, Engineer of Highways, Tarrant County, Texas.

James H. Sturdevant, Second Deputy in the New York State Commission of Highways, and a member of the A. R. B. A., was married on May 31 to Miss Mary P. Holme, of Summit, N. J.

A review of the 1912 work of the Bureau of Highways and Street Cleaning of Philadelphia, Pa., of which Wm. H. Connell, a director of the A. R. B. A., is Chief, is printed on page 1 of this issue. A large part of Mr. Connell's work in the service of the city of Philadelphia has been the complete reorganization of the department of which he has charge. Mr. Connell, who was formerly Assistant Commissioner of Public Works of the Borough of the Bronx, New York, N. Y., has taken an active part in the work of the A. R. B. A. At the last convention he presented one of the three papers dealing with the subject of the organization of highway departments, taking for his part the organization of the department in a city. His paper, "The Organization of a Highway Department for a Large City," was printed in "Good Roads" for February 1, 1913.

CORRESPONDENCE

An Indiana View of National Road Building

Editor "Good Roads":

Former Senator Bourne, of Oregon, just before his retirement from Congress, proposed a plan for national highway building which obtained the approval of some expert road builders but which, nevertheless, seems to me visionary or at best of doubtful utility.

Mr. Bourne's plan contemplated, first, the issuance of $1,000,000,000 in U. S. bonds, redeemable after a period of 50 years, and second, a further issuance of U. S. bonds to the amount of $2,000,000,000, also redeemable after a period of 50 years, for remittent repairs, the payment of a national highway commission and other continuous expenses, these bonds to bear 3 per cent. interest and to be non-taxable.

I cannot say I am in favor of either a national highway commission or national aid to the states in road building; and especially am I not in favor of the government issuing such long-time non-taxable bonds as proposed in Mr. Bourn'es plans for national road building. First, these bonds must eventually be redeemed, and it is surely unwise for a preceding generation to thus saddle and cinch a debt upon a succeeding generation, whilst the history of the past plainly teaches us that each succeeding generation has ever increasing burdens of taxation to bear. To this financial teaching we must eventually give heed or repudiation of such bonded indebtedness may come to be the only recourse of a generation crushed beneath the weight of a bonded indebtedness incurred by its predecessors. Then, too, the useful life of a highway is of comparatively short duration, so that by the end of the 50 years the highways—after having been rebuilt several times at a cost nearly equal to the first cost—would still be in a condition demanding the making of more billion-dollar bond issues. I would seriously question the right of a county, municipality or state to issue street or highway bonds of which the date of final redemption would be beyond the purview of those issuing such bonds. Those issuing bonds for such work should have cause to feel a certain personal responsibility for their redemption. This would tend to insure a better grade of work as well as the using of only first-class or high grade material in construction.

But Mr. Bourne also proposes that his $3,000,000,000 of bonds shall be non-taxable. This would mean that for a period of at least 50 years $3,000,000,000 of the country's wealth would be withdrawn from taxation, and as these sequestered billions could profitably be owned only by the wealthier portion of the people of the United States it leaves to the farmers and small property owners the increase of taxation due to this sequestering of the three billions of the moneys of the various states by the national government. I believe it to be far better for the citizens of the various states (in each separate unit) to pay direct taxes for the building and the maintenance of streets, thereby insuring a first-class, scientific, durable construction as well as the subsequent repair and upkeep.

I do not approve of government road building aid to the states as a national policy. We seem to be having wellnigh too much government as it is, and surely drainage and highway construction may well be left to the states where they properly belong. Government may take up again the work of completing the National Road (already built as far as St. Louis) and complete it to the Pacific Coast as a national military road whose construction, reconstruction and repair shall always be under the control of the armies of the United States.

WILLIAM EDWARD RYKER.

Madison, Ind.

NEW PUBLICATIONS

REPAIR AND MAINTENANCE OF HIGHWAYS.—By Laurence I. Hewes, Chief of Economics and Maintenance, U. S. Office of Public Roads. Bulletin No. 48, U. S. Office of Public Roads. Paper; 6x9 ins., 72 pp.; 3 plates, 13 figures.

This bulletin, issued May 15, 1913, is intended especially for the use of rural officials and others desiring information on the upkeep of country roads. In it, Mr. Hewes describes in detail the methods to be followed in repairing and maintaining macadam, earth, gravel and sand-clay roads, including bituminous resurfacing by both the mixing and penetration methods, dust prevention, road dragging and other pertinent subjects. There is also a section on road management, in which especial attention is given to Massachusetts, New York, England and France. The illustrations comprise three plates and 13 figures. On the plates there are six halftones showing properly and improperly maintained roads. The 13 figures consist of halftones showing road work in progress, sketches of road cross sections and split log drags, and a diagram showing the relation between maintenance expenditures and gross automobile revenues in Massachusetts. There are 34 tables in the bulletin presenting statistical information.

INSTRUCTIONS TO COUNTY HIGHWAY COMMISSIONERS AND FOREMEN FOR BUILDING STATE AID ROADS. BULLETIN NO. 2, WISCONSIN HIGHWAY COMMISSION.—Issued by the Wisconsin Highway Commission, Madison, Wis., under authority of the laws of 1911. Paper; 6x9 ins., 32 pp.

This book, as its sub-title implies, is issued to serve as a manual for the instruction of county highway commissioners and foremen in the work of building state aid roads in Wisconsin. A note stating—"Each county highway commissioner and each foreman on work will be expected to be familiar with the contents of this leaflet. Note especially the matter in black face type"—is displayed prominently on the cover. The contents of the book include an introductory chapter dealing with administrative and clerical matters, followed by several chapters on construction. These include general instructions and sections on grading; preparing for surfacing; surfacing with broken stone, gravel, shale, sand-clay and concrete; bridges, and accounting forms.

MEETINGS

Previously Reported

(Issues of June 14, 21 and 28.)

DONLEY COUNTY GOOD ROADS ASSOCIATION.—Organization meeting, Hedley, Texas. Page 352, June 14.

HALL COUNTY GOOD ROADS ASSOCIATION.—Organization meeting, Memphis, Tex., May 31. Page 355, June 21.

LAMPASAS, TEXAS.—Mass meeting, June 7. Page 355, June 21.

PORT TAMPA CITY, FLA.—Mass meeting, June 16. Page 359, June 28.

SAN ANTONIO, BLANCO AND GRANITE BELT HIGHWAY ASSOCIATION.—Annual meeting, Lampasas, Tex., June 8. Page 355, June 21.

COMING MEETINGS

July 8-10.—Indiana League of Municipalities.—Annual Convention, Gary, Ind. Secretary, A. P. Melton, Gary.

July 10, 11, 12.—Texas Good Roads Association.—Midsummer Congress, Corpus Christi, Texas. Secretary, Homer D. Wade, Stamford, Texas.

July 15-17.—Union of Canadian Municipalities.—13th Annual Convention, Saskatoon, Sask. Hon. Secretary and Treasurer, W. D. Lighthall, 305 Quebec Bank Bldg., Montreal, P. Q.

July 22-25.—League of Wisconsin Municipalities.—Annual Convention, Neenah, Wis.

July 30—August 1.—North Carolina Good Roads Association.—Annual convention, Morehead City, N. C. Secretary, Dr. Joseph Hyde Pratt, Chapel Hill, N. C.

August 11-13.—North Carolina League of Municipalities.—Annual meeting, Wrightsville Beach, N. C.

August 11-13.—Pacific Highway Association.—Fourth Annual Convention, Vancouver, B. C. Secretary, Frank M. Fretwell.

September 29-October 4.—American Road Congress.—Annual session, Detroit, Mich. Secretary J. E. Pennybacker, Colorado Building, Washington, D. C.

October 7-10.—American Society of Municipal Improvements.—20th Annual Meeting, Wilmington, Del. Secretary, A. Prescott Folwell, 15 Union Square, New York, N. Y.

November 10-15.—United States Good Roads Association.—Convention, St. Louis, Mo. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

December 9-12.—American Road Builders' Association.—10th Annual Convention, First Regiment Armory Bldg., Philadelphia, Pa. Secretary, E. L. Powers, 150 Nassau St., New York, N. Y.

February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

Texas Good Roads Association

The program for the mid-summer congress of the Texas Good Roads Association, which will be held in the Olympic Theater, Corpus Christi, Tex., July 10, 11 and 12, has been prepared as follows:

July 10, 10 a. m.—Address of Welcome on behalf of the City, Mayor Roy Miller; Address of Welcome on behalf of Neuces County, County Judge Walter F. Timon; Response, Homer D. Wade, Secretary, Texas Good Roads Association, Stamford; President's Address, John W. Warren; Address, "Relation of Good Roads to Public Education," F. M. Brally, State Superintendent of Public Instruction; Address, "Road Construction with Clam or Oyster Shells," J. M. Howe, Highway Engineer, Houston; Appointment of Committees; Announcements.

2 p. m.—Address, "Looking Forward," Senator J. G. Willacy, Portland; Address, "Good Roads a Factor in Keeping Boys on the Farm," E. W. Kirkpatrick, McKinney; Address, "Sand-Clay and Gravel Roads," Geo. D. Marshell, Highway Engineer, Bexar County; Reports from Highway Leagues and Counties.

4:30 to 6 p. m. and 8 to 10 p. m.—School of Instruction in the rooms of the Commercial Club, conducted by Prof. R. J. Potts of the Agricultural and Mechanical College, College Station.

July 11, 9:30 a. m.—Address, "Best Methods of Financing Road Construction," J. P. Pool, Victoria; Address, "The Economic Value of Good Roads," Dr. L. I. Hewes, U. S. Office of Public Roads, Washington, D. C.; Address, "Comparison: The Educator and the Money Saver," Major Wm. Bradburn, Consulting Engineer, Houston.

2 p. m.—Address, "The Need of a Highway Commission in Texas," Senator H. B. Terrell, West; Address, Dell M. Potter, President, Southern National Highway Association; Address, "Can Convicts be Utilized in Building Good Roads?" Ben Cabell, Chairman, Texas State Prison Commission; Address, "Business Phases of Road Improvement Contracts," Terrell Bartlett, San Antonio.

4:30 to 6 p. m. and 8 to 10 p. m.—School of Instruction.

July 12, 9:30 a. m.—Address, "The Woman's Interest in Good Roads," Mrs. G. R. Scott, Corpus Christi; Address, "Road Administration and Road Improvement," Julian Feild, Denison; Address, "General Highway Construction and Maintenance," J. F. Witt, Dallas; Business Session.

At noon, July 12, a fish fry will be held at the Epworth League grounds, and addresses will be delivered by Judge O. E. Dunlap, Waxahachie, and J. C. Nagle, of the Agricultural and Mechanical College, College Station.

At the Texas Commercial Secretaries' Institute, which will be held at Mineral Wells, Texas, July 15 to 19, inclusive, the entire second day will be devoted to the subject of roads. J. C. Travilla, formerly Street Commissioner of St. Louis, Mo., who is now superintending the construction of the $1,000,000 road system in Tarrant County, will deliver an address, as will also B. B. Buckeridge, General Secretary of the Texas Commercial Secretaries' and Business Men's Association, and R. O. McCormack, Secretary of the Fort Worth Chamber of Commerce, and others.

A mass meeting of the owners of land contingent to the route of the proposed road which is to be constructed from Helena to Elaine and Wabash in Phillips County, Ark., will be held at the Grand Opera House, Helena, July 9, at which time the matter of actual construction will be discussed and efforts will be made to inaugurate a beginning of the undertaking. The plans provide for the construction of an 8-ft. concrete and crushed rock road along the line of the Memphis, Helena & Louisiana Railway.

A committee has been appointed by the Chamber of Commerce of Coalinga, Cal., to take up the matter of holding a mass meeting for the promotion of a road bond issue in Fresno County. It has been suggested that the meeting be held in the city of Fresno.

REPORTS

CITY OF NEWPORT, R. I.; STREET AND HIGHWAY DEPARTMENT, MUNICIPAL YEAR OF 1912.—Paper; 6x9 ins.; 130 pp.

This report, submitted by Street Commissioner J. K. Sullivan, includes statements of the work of street construction and maintenance, cleaning, watering and dust prevention and other appurtenant work. A considerable amount of space is given to a detailed statement of street watering, showing the amounts of water used and the cost, and to similar data on the use of Dustoline. Other matters included in the report are statements of the work of the city quarry and crusher, and of details of pavement, sidewalk and bridge work.

HUDSON COUNTY (NEW JERSEY) PARK COMMISSION, REPORT FOR THE TWO-YEAR PERIOD FROM NOVEMBER 30, 1910, TO NOVEMBER 30, 1912.—Paper; 6x9 ins., 40 pp.; illustrated.

Two reports are included in this, that of Landscape Architect Chas. N. Lowrie and Superintendent Fred C. Hoth. The text of the reports covers, in a general way, the work done under the supervision of the officers during the two-year period, the details being shown by tabular statements. The illustrations consist of halftones, most of them full page cuts, showing scenes in the several parks under the jurisdiction of the commission. The report also contains a map of Hudson County on which is indicated the location of the parks owned and controlled by the commission.

REPORT OF SUGGESTED PLAN OF PROCEDURE FOR THE CITY PLAN COMMISSION, JERSEY CITY, N. J. Report submitted for the use of the City Plan Commission of Jersey City by E. P. Goodrich, Consulting Engineer of the Borough of Manhattan, and Geo. B. Ford, of Geo. B. Post & Sons, Architects, New York, N. Y., on November 30, 1912, and issued May 1, 1913. Paper; 7x10 ins., 64 pp.

This report, which is noted at more length in another part of this issue, contains the suggestions of Messrs. Goodrich and Ford regarding the methods to be followed by the City Plan Commission of Jersey City in the prosecution of its work. The report covers 26 items incident to the problem of city planning, including street traffic, grading and surfacing of streets, width of roadways and sidewalks, widening of present streets, and cutting through of new streets, development of park and park systems and connecting boulevards, and planting on the city streets. Each item is taken up separately and discussed in detail, and recommendations made for work along that particular line.

EIGHTEENTH ANNUAL REPORT OF THE BOARD OF PARK COMMISSIONERS OF INDIANAPOLIS, IND., FOR THE FISCAL YEAR ENDING DEC. 31, 1912. Paper: 6x9 ins., 92 pp., insets; illustrated.

In this report of the Board of Park Commissioners, consisting of Henry Jameson, John J. Appel, Chas. E. Coffin and Ferdinand L. Mayer, are included the reports of Landscape Architect Geo. E. Kessler, Executive Officer James H. Lowry, Horticulturist H. Houston Tall, Chief of the Field Corp J. E. Perry and Chief Clerk Chas. A. Myers. Besides detailed accounts of the work of the various officers, the report includes many pages of statistics, principally cost data, and a large amount of other information. The frontispiece is an inset panoramic view of the business section of Indianapolis. The other insets comprise a plan of the bridge over Crooked Creek in West Riverside Park, a map of the proposed Merritt Playgrounds, two tables showing the distribution of maintenance cost, a map of Riverside Park and a map showing the present and proposed park and boulevard system of the city. The report is excellently printed on cream colored paper, and is profusely illustrated by halftones.

REPORT OF THE BUREAU OF ENGINEERING OF THE DEPARTMENT OF PUBLIC WORKS OF THE CITY OF ALBANY, N. Y., FOR YEAR ENDING OCT. 31, 1912. Paper; 6x9 ins., 62 pp. and inset table; illustrated.

This comprises the annual report of City Engineer Frank R. Lanagan to the Mayor of the City of Albany. It covers the work of the Bureau of Engineering, in which is included work in connection with streets, sewers and other subsurface structures, public baths, wharves, parks and public buildings. It contains a detailed account of the activities of the bureau along the lines mentioned together with statistics showing costs and other features of the work. The tables are six in number, four of them, which are noted elsewhere in this issue, presenting data on pavement work in the city during the past 28 years. The fifth table is a summary of tests of brick paving blocks, and the sixth, which is in the form of an inset, is a summary of the engineering contracts completed during the period covered by the report.

PERSONAL NOTES

Bascom Sykes, formerly City Engineer of Portsmouth, Va., died June 3.

Marshall Howard has been appointed County Road Engineer of Montgomery County, Ia.

Thomas H. Canavan has been appointed Commissioner of Public Works of East St. Louis, Ill.

T. H. Johnson has been elected Commissioner of Streets and Parks and James Sweeney has been appointed City Engineer of Pensacola, Fla.

H. M. Garden, formerly County Engineer of Tom Green County, Tex., has been appointed City Engineer of San Angelo, Tex., succeeding J. J. Goodfellow.

The City Council of Elizabeth, N. J., has retained Clarence A. Bingham of Carlisle, Pa., as consulting engineer in connection with various municipal improvements.

W. H. Metcalf has been appointed City Engineer of San Gabriel, Cal. Mr. Metcalf is a member of the civil engineering firm of Metcalf & Wiggins of Los Angeles.

Frank W. McKinney has been appointed Chief Engineer of the Commission for Opening Streets of Baltimore, Md. Mr. McKinney was formerly Assistant Engineer of the Baltimore Sewerage Commission.

J. B. Hunter, City Engineer of Denver, Colo., under the old form of government, was elected Commissioner of Improvements and President of the Board of Public Works of that city under the new commission system which became effective June 1. Mr. Hunter has appointed H. F. Meryweather, Chief Assistant City Engineer under the old system and a member of the engineering staff for the past 23 years, City Engineer and Member of the Board of Public Works. He has also appointed W. A. Sheriff Commissioner of Highways, the third member of the board.

James G. Collins, who for the past nine years has been seeking reinstatement as Superintendent of Highways of the Borough of Manhattan, New York City, has secured a final decree through the affirmation by the Court of Appeals of New York City on June 17 of a peremptory mandamus issued by Justice Bischoff directing his reinstatement. Mr. Collins was appointed Superintendent of Highways in January, 1902, by Borough President J. A. Cantor, and was dismissed in 1904 by Borough President Ahearn without preferment of charges. George F. Scannell was appointed to succeed him, and Mr. Collins immediately instituted proceedings for reinstatement, alleging that his removal was illegal. The case has been extremely involved, and though several decisions in Mr Collins' favor have been handed down, appeals have been taken each time.

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The Third International Road Congress

The Third International Road Congress was held at London, England, June 23 to 28, and was attended by several thousand delegates representing national governments, states, cities, public institutions, organizations of various kinds and private corporations from all parts of the world. The congress comprised the meetings of the sections for the consideration of technical questions, committee meetings, an exhibition of road machinery and materials, social functions and excursions to road and other engineering works and points of interest in England, Scotland and Wales.

The work of the congress was divided into two sections, each of which comprised two sub-sections, as shown in the schedule printed on pages 331 and 332 of "Good Roads" for June 7. The first section, "Construction and Maintenance," included sub-sections A and B, comprising Questions 1 to 4, inclusive, and Communications 1 to 5, inclusive. The second section, "Traffic and Administration," included sub-sections C and D, consisting of Questions 5 to 9, inclusive, and Communications 6 to 10, inclusive. Each sub-section had its own officers and conducted its sessions separately and independently, except that certain matters of common interest were discussed by the two sub-sections in each section in joint meetings. These joint meetings were under the direction of executive committees formed from the executive committees of the two sections and were presided over by one of the chairmen, chosen by the Permanent Council.

The questions—and, when time permitted, the communications—were discussed first at the sectional meetings and later at the general meeting. Before each discussion a general reporter, chosen by the Permanent International Commission, presented a brief summary of the papers dealing with the subject under consideration. The meetings were then thrown open to general discussion, each speaker being limited to ten minutes and allowed to speak only twice on the same subject, unless given permission by the meeting to speak longer or more than twice. After the discussion on each question one or more general reporters were appointed to support before the general meeting the conclusions adopted.

The road exhibition, which was held at the Royal Horticultural Hall, Westminster, during the week of the congress, included exhibits of machinery and materials, models, maps and publications; exhibits relating to traffic and its development, and exhibits showing the history and development of roads and streets. There were about 80 commercial exhibitors from England and other countries, including the United States, and many exhibits not of a commercial nature. Heavy machinery and other exhibits not suited to indoor display were shown on grounds adjacent to the hall.

The excursions were divided into three groups, one group taking up the week preceding the congress, one the week of the congress and one the week following. A complete list of the excursions was printed on pages 229 and 230 of "Good Roads" for April 5.

The first formal meeting in connection with the congress was that of the Permanent International Commission of Road Congresses, which was held at the headquarters of the Institution of Mechanical Engineers at 10 a. m. Monday, June 23, with President Albert de Preaudeau in the chair. Among the matters taken up were plans for the fourth congress, the auditing of the 1912 accounts and the confirmation of the award of the prize of the Second International Road Congress to Francis Wood, M.Inst.C.E., of England.

At 11:30 a. m. the Permanent Council met, its chief business being the appointment of the officers of the sections and sub-sections. One president, a vice president from each of the several countries and a secretary from each of these countries were chosen for each of the four sub-sections; two presidents were appointed for the joint sessions of sub-sections A and B, and one for the joint sessions of C and D. Among these officers were five delegates from this country —Nelson P. Lewis, Col. Wm. D. Sohier and S. Hill, vice presidents, and Clifford Richardson and E. L. Powers, secretaries.

The formal opening of the congress took place at the Wesleyan Central Hall at 2:30 p. m. The Right Hon. the Chancellor of the Exchequer, Lloyd George, opened the proceedings and welcomed the delegates on behalf of the British government. Before making his address Mr. Lloyd George proposed sending to the King a telegram conveying the greetings of the congress and expressing thanks for the invitation to visit Windsor Castle. The telegram was sent and before the close of the meeting a reply was received from King George expressing thanks for the greetings, wishing the congress success and expressing pleasure that some of the delegates would visit Windsor.

Sir George S. Gibb, Chairman of the Road Board of Great

Britain and President of the Congress, spoke next, welcoming the delegates, reviewing the history of the international congresses and touching upon many points of road work.

Other speakers at the meeting were Andre Chargueraud, France; Paul Etier, Switzerland; J. von Forster, Hungary; Hugo Franz, Austria; H. Genard, Belgium; Dr. E. Guglielminetti, Monaco; Col. Wm. De H. Washington, New York State, U. S. A.; Dr. T. Lewald, Germany; Luigi Luiggi, Italy; Elie Radu, Roumania; Rufo Garcia Rendueles, Spain; J. Skougaard, Norway; A. N. Stolpakow, Russia; Wand, Bavaria, and J. N. Welcker, The Netherlands.

In the afternoon the exhibition was formally opened by the Right Hon. Earl Beauchamp, President of the Exhibition Committee of the Congress. In his address Lord Beauchamp congratulated those who had arranged the exhibition and, on behalf of the government, wished it success. A suggestion had been made that President Poincare of France, while visiting the King, might attend the exhibition, but a letter from his secretary was read in which he expressed his regret that since he was a guest of the King and the British government he could accept no invitations other than those coming through one of those two sources.

In the evening a conversazione in honor of the delegates was held by the Corporation of the City at the Guildhall. The guests, who numbered nearly twenty-five hundred, were received by the Lord Mayor and the Lady Mayoress. The entertainment included concerts by the Royal Artillery Band, students of the Guildhall School of Music and the boy pipers of the Royal Caledonian Asylum, an exhibition of books and records, and dancing.

The first meetings of the sections for the consideration of questions coming before the congress were held at 10 a. m. on Tuesday morning. At that hour the First Section—Sub-Sections A and B combined—met at Caxton Hall and the Second Section—Sub-Sections C and D combined—met at the Institution of Mechanical Engineers. At 2:30 p. m. Sub-Sections A and B of the First Section and Sub-Section C of the Second Section met again for the further discussion of questions and communications.

On Wednesday, June 25, the meetings of the sections were continued, simultaneous meetings of the two sections being held at 10:30 a. m. and at 2:30 p. m. At 9 p. m. a reception was given to the delegates by the Institution of Civil Engineers at Albert Hall. About 3,000 were in attendance.

No sectional meetings were held on Thursday, June 26, the day being devoted entirely to excursions—four of the eight excursions during the week of the congress being scheduled for this day. In addition to these, the delegates visited Windsor Castle, at the invitation of King George, and at 9 in the evening attended a reception at the Royal Automobile Club.

The morning of Friday, June 27, was occupied by meetings for the completion of unfinished business, and in the afternoon the final meeting of the congress was held in Caxton Hall. At this, the report of the work of the several sections was presented and the resolutions adopted at the sectional meetings were submitted for confirmation by the congress. Most of these resolutions were adopted as the conclusions of the congress with very little modification. The closing address was made by Sir George Gibb, Chairman of the Road Board. After the final meeting, a number of the delegates attended a garden party given by the President, the Council and members of the Surveyors' Institution at the Royal Botanical Gardens. The evening was devoted to theater parties at various London playhouses.

The next day, Saturday, June 28, was taken up by the four remaining excursions scheduled for congress week. Two of these were short excursions made during the day, while the other two occupied three days, the start being made on Saturday. At 7:30 p. m. a banquet was held at the Hotel Cecil, and at 9 p. m. the closing function of the congress—a reception at the Hotel Cecil—was attended by a large number of the delegates.

The work of the congress comprised the discussion of nine questions and ten communications, which were grouped in four sub-sections and two sections, as noted previously. These questions—which were printed in the issue of June 7, together with the names of the authors of the papers on each one—were as follows:

SECTION I

CONSTRUCTION AND MAINTENANCE.

Questions Common to Sub-Sections A and B

1st Question.—Planning of New Streets and Roads.

2nd Question.—Type of Surfacing to Be Adopted on Bridges, Viaducts, etc.

Communications Common to Sub-Sections A and B

Communication 1.—Improvements Adopted Since the Second Congress in Machinery Used in the Construction and Maintenance of Macadamized Roads.

Communication 2.—Tests of Materials Used in the Construction of Macadamized Roads.

Sub-Section A

3rd Question.—Construction of Macadamized Roads Bound with Tarry, Bituminous or Asphaltic Materials.

Communication 3.—Construction of Water Bound Macadamized Roads.

Communication 4.—Technical and Economic Study of the Comparative Advantages of Different Types of Roads.

Sub-Section B

4th Question.—Wood Paving.

Communication 5.—Various Types of Stone Paving in Use.

SECTION II.

TRAFFIC AND ADMINISTRATION

Questions Common to Sub-Sections C and D

5th Question.—Methods of Lighting Public Highways and Vehicles.

Sub-Section C

6th Question.—Observations Noted Since 1908 as to the Various Causes of Wear and of Deterioration of Roadways.

7th Question.—Regulations for Fast and Slow Traffic on Roads.

Communication 6.—Direction and Distance Sign Posts.

Communication 7.—Development Since the Second Congress of Self-Propelled Public Service Vehicles.

Sub-Section D

8th Question.—Authorities in Charge of the Construction and Maintenance of Roads; Functions of Central Authorities and Local Authorities.

9th Question.—Finance of the Construction and Upkeep of Roads; Provision of Revenues.

Communication 8.—Qualifications of Engineers and Surveyors in Charge of the Construction and Maintenance of Roads; Wages and Conditions of Service of Foremen and Roadmen.

Communication 9.—Statistics of Cost of Construction and Maintenance.

Communication 10.—Terminology Adopted or to Be Adopted in Each Country Relating to Road Construction and Maintenance.

Seventy-six reports were presented in the consideration of the nine questions and 64 reports were presented on the ten communications, making 140 in all. As in many instances, a report was prepared by several authors, each of which presented a separate one, the actual number of separate papers was even larger than this.

In the issue of August 2 a more complete report than space allows to be printed here will be published. One paper presented at the congress—that of Nelson P. Lewis, Chief Engineer of the Board of Estimate and Apportionment of New York City, on the subject of street and road planning—was printed in the issue of July 5, and other papers will be printed in the issue of August 2 and subsequent numbers as space permits.

The City Engineer's office of Salt Lake City, Utah, has prepared a preliminary map of the proposed scenic highway around the base of Ensign Peak to Bountiful. This highway will be a link in the Salt Lake and Morgan highway. The map will be placed before the City Commission by Commissioner W. H. Korns, with the request that the road be built with prison labor.

National Pike to be Rebuilt in Ohio

It has been decided that the state of Ohio and the federal government will rebuild the National Pike in Ohio between Columbus and Zanesville, a distance of nearly 50 miles. The cost will amount to approximately $360,000, of which the federal government will pay $120,000, and the various counties through which the road runs, $240,000.

The sum which the federal government will apportion for this purpose represents Ohio's share of the $500,000 recently appropriated by Congress for the improvement of post roads in the states, upon condition that each state should appropriate an amount equal to twice the sum allotted to it by the government. It is reported that but four states have decided to accept the conditions and take advantage of the government's grants.

State Highway Commissioner James R. Marker recently paid a visit to Washington, and on the strength of his assurance that Licking and Muskingum Counties, in which the section of the National Road to be improved is located, would appropriate their share of the cost necessary to get the government allowance, favorable action was taken on the state's application for the sum of $120,000.

Of the entire stretch to be improved, 30 miles are in Licking County, which will appropriate $140,000, and 10.5 miles are in Muskingum County, which will raise $100,000. There are also 8.7 miles in Franklin County, but it is stated that no paving at all may be necessary in that county on account of the present good condition of that section of the road.

The National Pike is a part of the original Cumberland Road built by the federal government between 1836 and 1837 as a military or post road. The highway extends from Cumberland, Md., through Wheeling, W. Va., Cambridge, Zanesville, Columbus and Springfield, O., and Richmond, Ind., terminating near the western border of Illinois.

Brick has been mentioned as the material with which the Ohio section will be paved, but has not been finally decided upon. The hoad is a popular one with automobilists and is also much used by the farmers of the rich agricultural regions through which it passes.

Proposed Street Improvement in Los Angeles, California

The Streets and Boulevards Committee of the City Council of Los Angeles, Cal., has approved a plan for the immediate improvement of a large number of streets in the district between Macy and 7th Sts., and San Pedro St. and the Los Angeles River. This section is one of the oldest in the city and the plans contemplate the improvement of the sanitary conditions of the district, and also improving its general appearance.

The committee recommended that the City Engineer be instructed to prepare ordinances for the work comprising paving and construction of sidewalks, curbs and gutters on portions of the following streets: Rose, Hewitt, Barry, Vignes, Banning, Turner, Jackson, Ducommon, Alameda, La Fayette, Garcia, Lyon, Ramirez, Howard, Sixth, Mateo, Jessie, Industrial, Kohler, Boyd, Azusa and Market Sts., and Santa Fe, Gladys and Ruth Aves.

The Board of Contract and Supply of Albany, N. Y., has awarded the contract for repaving North Pearl St., between State St. and Clinton Ave., and several other, smaller sections, of streets with creosoted wood blocks at a total cost of $69,742.50. These are the first streets in the city to be paved with wood blocks treated with creosote. A section of Hudson St. was paved many years ago with wood blocks before the creosoting process had been discovered, but the pavement soon wore out. M. F. Dollard of Albany secured the contract.

Proposed Improvement of Broadway, Borough of Queens, New York City

A committee of the Board of Estimate and Apportionment of New York City, appointed to pass on the roads of the Borough of Queens, has proposed that a report be made on the proposed widening of Broadway, Flushing, to 130 ft., and the construction of a parkway through the center.

It is estimated that the entire work, which will cover seven miles between Flushing River and the Nassau County line will cost about $1,000,000, and according to the present tentative plans of the Committee the expense will be apportioned so that the city of New York will pay 50 per cent. of the cost, the Borough of Queens 30 per cent. and the abutting property owners 20 per cent.

It has been proposed by the committee that a main roadway for automobiles, a narrower roadway for slow moving vehicles and a wide sidewalk be constructed, on each side of the parkway.

Surveys are being made and estimates prepared for the construction of a model dirt road in Faulkner County, Ark., extending east and north from Conway, a distance of about 15 miles.

MEETINGS

A good roads meeting held at Guin, Ala., June 23, was attended by delegates from Fayette, Tuscaloosa, Hamilton, Florence, Russellville, Winfield and other localities. Judge W. W. Brandon of Tuscaloosa presided over the meeting, the purpose of which was to adopt some plan which can be presented to the state Legislature with the view of securing appropriations to assist the different counties in building a highway between Florence and Tuscaloosa. The route of the proposed highway runs through Lauderdale, Colbert, Franklin, Marion, Fayette and Tuscaloosa Counties, connecting with the proposed trunk highway between Montgomery and Mobile.

At a mass meeting of the citizens of Ozark, Mo., held June 28, preliminary steps were taken in a movement to construct a county highway between Ozark and Forsyth, along the route of the transmission line of the Ozark Power & Water Co. A committee on right-of-way was appointed to make a trip over the proposed route by automobile for the purpose of learning the sentiment of the people along the way and to ascertain what financial help could be obtained. If the existing road running about 18 miles to the Taney County line is utilized it must be widened about 10 ft. its entire length, according to the new state law, which directs that all county roads must be 40 ft. wide.

COMING MEETINGS

July 15-17.—Union of Canadian Municipalities.—13th Annual Convention, Saskatoon, Sask. Hon. Secretary and Treasurer, W. D. Lighthall, 305 Quebec Bank Bldg., Montreal, P. Q.

July 22-25.—League of Wisconsin Municipalities.—Annual Convention, Neenah, Wis.

July 30—August 1.—North Carolina Good Roads Association.—Annual convention, Morehead City, N. C. Secretary, Dr. Joseph Hyde Pratt, Chapel Hill, N. C.

August 11-13.—North Carolina League of Municipalities.—Annual meeting, Wrightsville Beach, N. C.

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October 7-10.—American Society of Municipal Improvements.—20th Annual Meeting, Wilmington, Del. Secretary, A. Prescott Folwell, 15 Union Square, New York, N. Y.

November 10-15.—United States Good Roads Association.—Convention, St. Louis, Mo. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

December 9-12.—American Road Builders' Association.—10th Annual Convention, First Regiment Armory Bldg., Philadelphia, Pa. Secretary, E. L. Powers, 150 Nassau St., New York, N. Y.

February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

PERSONALS

Bruce Randall Morton, former City Engineer of Newport, Ky., died recently at his home in Fort Thomas, Ky.

Carl Griesbach has been designated as the engineer to take charge of the improvement of 15th St., Hoboken, N. J.

Philip D. Borden, for over 30 years City Engineer of Fall River, Mass., has resigned.

Richard E. Elsner has resigned from the office of City Engineer of Cadillac, Mich., and will go to Portland, Ore.

W. S. Kates has been elected Commissioner of Streets and Public Improvements of Millville, N. J.

C. F. Ross has been appointed chairman of the Committee on Streets and Parks of Napa, Cal.

Albert Johnson has been appointed Street Superintendent of Dayton, O.

George Schafer, of New York City, has been appointed Superintendent of Highways of Livingston County, N. Y.

James J. Ferris has been elected Commissioner of the Department of Streets and Public Improvements of Jersey City, N. J., under the new commission form of government.

Jesse Taylor of Jamestown, O., has been appointed General Secretary of the National Highways Association, Washington, D. C.

John Strutt has been appointed Superintendent of Construction for the system of roads being built in Charlestown Township, Ky.

A. S. Wootton has been appointed Park Engineer for the city of Vancouver, B. C. The office is a new one, recently created by the Park Board.

Herbert Munn has been appointed Consulting Engineer for El Paso County, Texas. Mr. Munn is City Engineer of El Paso, and will retain that position.

Samuel H. Lea, formerly State Engineer of South Dakota, has been appointed an engineer on the staff of the New York City Public Service Commission, in connection with subway construction.

Daniel M. Edgerton has been appointed Acting Division Engineer of the Sixth Division of the New York State Department of Highways by State Commissioner of Highways John N. Carlisle.

Charles W. Campbell, City Engineer of St. Joseph, Mo., who has been serving as engineer for the Park Board of that city for several months, has resigned from the latter office.

Charles Draney, Superintendent of the municipal asphalt plant of Denver, Colo., has resigned that office to accept a position as manager of the local agency of John Baker of Chicago, Ill. W. B. McGilvray succeeds Mr. Draney as Superintendent of the asphalt plant.

Among the committees announced by Mayor Chamberlain of East St. Louis, Ill., is the Street Committee, consisting of the following: J. D. Roche, Ed. Dowling, H. R. Huschle, C. F. Short, T. Hahn, C. A. Arnold, Wm. Leber and Louis Runtz.

In "Good Roads" for June 21 the announcement was made that A. E. Home had been appointed City Engineer of Beloit, Wis. This statement was incorrect, Mr. Home having been made City Engineer of Beloit, Kan. Robert R. Caldwell is City Engineer of Beloit, Wis., having held that office for nearly 15 years.

NEWS OF THE TRADE

The Texas Asphalt Paving Co., of El Paso, Tex., has been incorporated with a capital stock of $6,000. J. W. Eubanks, J. Deemer and W. H. Winter are the incorporators.

The Reading Cement and Paving Co., composed of Samuel Hoverter and J. R. Dunkle, has been organized in Reading, Pa., and will engage in street paving and contracting.

The Columbia Vitrified Clay Products Co. has been organized in Columbia, S. C., with a capital stock of $100,000. It will establish a plant for manufacturing paving and other brick.

George H. Ford, President and General Manager of the Universal Road Machinery Co., has resigned and the Board of Directors has elected S. H. Chauvenet President and appointed R. E. Leighton General Manager. Mr. Leighton has been retained in his position of Assistant Secretary and Treasurer. The directors have also decided to transfer the executive offices of the company from New York City to Kingston, N. Y.

The Sullivan Machinery Co. of Chicago, Ill., recently issued two new bulletins, Nos. 58M and 66M. Bulletin No. 58M describes Sullivan cross compound power driven air compressors of three classes, WJ-2, WN-2, and WS-2. Bulletin No. 66M is devoted to a description of Sullivan plug and foot hold and hand feed hammer drills and stone dressing tools. Each of the bulletins measures 9 ins. by 6 ins. and contains 20 pages. Both bulletins are profusely illustrated. The company is also distributing a new catalogue describing the company's general line of air compressors. The catalogue measures 5½ by 3¼ ins., contains 32 pages and cover, and is illustrated.

An attractive catalogue has been issued by the American Casting Co. of Birmingham, Ala., describing the company's line of cast iron culvert pipe, designated as the "National" lock-joint pipe. The text of the catalogue comprises specifications for the various sizes of pipe, tables of weights and measures of the different units, as well as a detailed description of the product. Several letters of recommendation from users of the "National" lock-joint pipe are included. The catalogue comprises 24 pages and cover, and contains many illustrations showing culverts constructed of "National" lock-joint pipe and cross sections of the pipe itself. The inside is printed in two colors on heavy coated paper, and the cover is dark green in color, embossed in black and gold. It measures 9⅛ by 6¼ ins.

GOOD ROADS

A Weekly Journal of Road and Street Engineering and Contracting

Old Series, Vol. XLIV.
New Series, Vol. VI.

NEW YORK, JULY 19, 1913

Number 3

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New State Highways in Pennsylvania

The Pennsylvania State Legislature has enacted a measure providing for the construction of nearly 1,000 additional miles of main highways.

The measure, which is known as the E. E. Jones bill, designates 78 new routes traversing practically every county in the state. The Sproul highway measure, which became a law in 1911, provides for 296 routes. The additional routes which will be established if Governor Tener approves the latest bill will be numbered serially from 297 to 374. Some of the proposed routes will traverse sections of the main highways established by the Sproul act, and where this is not the case they will connect one main route with another.

The Jones measure makes no appropriation, but provides that the work of improving the new roads shall be paid from the highway department's appropriations provided by the Sproul act.

The Jones measure originally established a single route in Susquehanna County, but because of the great number of similar bills introduced during the present session of the Legislature it was decided to make an omnibus measure to carry as many as the Legislature saw fit to approve, and this measure was selected as the one to be so revised.

It is stated that between 200 and 300 new route bills were introduced into one or the other branch of the legislature, providing for an aggregate of about 3,500 miles of new highways.

It is believed that there is little doubt that Governor Tener will approve the measure.

The City Council of Hagerstown, Md., is considering a resolution providing for the paving of 86 blocks of streets and alleys at an approximate cost of $160,000.

Proposed Street Extension in New York City

Maps are being prepared by Topographical Engineer Moore of the Borough of Queens, New York City, for the extension of 13th St., College Point, to Jackson Ave. It is considered that the carrying out of this plan will shorten the distance between College Point and the Boroughs of Manhattan and Brooklyn by approximately one mile.

The original plan as submitted to the Board of Estimate and Apportionment provided for carrying the highway 100 ft. wide through the meadows at an estimated cost of about $1,000,000. On account of the excessive expense the plan was laid over and has now been altered so that by reducing the width of sidewalks to make the highway 80 ft. wide, the cost will be about $800,000, including that of the highway across the meadows and the bridges.

Civil Service Examinations for Highway Engineers

The United States Civil Service Commission has announced that an examination will be held August 6 to secure eligibles for the position of civil engineer student, United States Office of Public Roads, carrying a salary of $720 per year.

The New York State Civil Service Commission will hold examinations July 26 for the following positions: Division Engineer, State Department of Highways, $4,000 per year; Bridge Designer, $1,501 to $2,100 per year; Junior Bridge Draftsman, $901 to $1,200 per year; Inspector of Construction, State Department of Highways, salary $3.50 to $4.50 per day.

The examination for the federal service will be held at various principal cities throughout the country, and those for the New York State service in several of the leading cities of the state.

Regulations for Road Work in Missouri

State Highway Commissioner Frank W. Buffum of Missouri has established a set of requirements which must be met by every county in the state before it can participate in the state funds set aside for the dragging of roads between county seats. These requirements are that the width of the road must be 40 ft., of which 30 ft. must be in the crown of the road; every road must be graded and ditches must be kept open; culverts of concrete or other durable material must be constructed, and grading must be done before late fall, so the roads will become hard.

The sum of $225,000 has been appropriated for dragging roads that connect county seats, the highways thus treated to be designated by county highway boards appointed by the county courts of the several counties. The most feasible routes between county seats must be selected.

Commissioner Buffum will visit as many of the counties of the state as possible within the next few weeks for the purpose of advising the county authorities in the selection of roads to be dragged.

New California State Highways

Highway laws recently passed in California providing the sum of $115,000 for the construction and maintenance of state roads other than those included in the $18,000,000 state highway plan will go into effect in August of this year.

The most important project for which appropriations have been made is the construction of a road between Saratoga Gap and Redwood Park, at a cost of about $70,000. This road will connect other main routes in California with the park so that automobile tourists or others traversing the main coast route will be enabled to make the trip to the park without difficulty.

An appropriation of $25,000 is also made for the Myers-McKinney Highway running along the west side of Lake Tahoe, between the Emigrant Gap Road and the old Tahoe Road, so that the lake can be reached either way. At present travelers going to Lake Tahoe by way of Tallac are obliged to make a detour of over 100 miles, by way of Glenbrook, Carson City and Reno.

Other appropriations are made to provide for the maintenance of the Trinity-Humboldt Road between the Sacramento Valley and Eureka, and the North Pacific section; the Emigrant Road; the Alpine state highway system embracing the counties of Amador, Calaveras, Tuolumne and Alpine, and the Placerville Road to Lake Tahoe.

Another act was passed which facilitates cooperation between the state and the counties by providing that any highway not exceeding $50,000 in cost, of which the county pays two-thirds and the state one-third, may be constructed on a four-fifths vote of any county board of supervisors. In case the estimate of cost exceeds $50,000 the vote of the people of the county is necessary. In either case the project must be approved by the State Engineering Advisory Board.

Another act provides that counties may share jointly in the construction of bridges on state routes.

Initial steps have been taken toward the widening of South Pearl St., at the corner of State St., Albany, N. Y.

By order of the Board of Municipal Commissioners of Dallas, Tex., Wood St., in that city, is to be widened for a part of the distance betwen Ervay and Akard Sts. at the expense of the property owners.

A petition has been forwarded to President Wilson asking for a federal appropriation of $5,000,000 for the purpose of constructing a bridge across the Delaware River between Philadelphia, Pa., and Camden, N. J.

A bill is being prepared for introduction in Congress by Representative F. D. McKellar of Memphis, Tenn., asking for the construction, by the federal government, of a boulevard between the city of Memphis and the National Cemetery, a distance of about ten miles.

It is stated that Palo Pinto County, Tex., has raised $10,000, Parker County $20,000, and Tarrant County $50,000 for their shares of the expense of constructing a federal post road between Fort Worth and Mineral Wells, by way of Weatherford. The government's allotment for the highway will be $40,000.

Approximately one hundred business men of La Jara, Colo., recently spent a day working on the old Conejos County road leading to the Platoro mining district. The road has a four per cent. grade, and is considered superior to the roundabout route which has been in use for several months following the inundation of the old road during the irrigation season.

Mayor of New York City Vetoes Plan for the Change of Grade at Fourth Ave. and 34th St.

Mayor Gaynor of New York City has vetoed the plan for changing the grade of 34th St. at the junction of Park Ave. The Mayor explained his position by calling attention to the damage which would be done to property by carrying out the provisions of the plan.

He stated that the lowering of the grade at 34th St. 6 ft., as provided, would leave the houses on that street above the new grade for a considerable distance on either side of Park Ave., while the lowering of the grade of Fourth Ave. south of 34th St. would leave property on the west side of Fourth Ave. above the new grade. The Mayor also objected to the tearing up of the parkway in the center of Park Ave. between 34th and 35th Sts.

The city of Imperial, Cal., has ordered the construction of 18 miles of cement curbing, 14 miles of concrete sidewalks, 2 miles of concrete street paving and of 6 miles of street grading. The total cost of the work will be approximately $200,000.

The Board of Aldermen of Buffalo, N. Y., has voted to issue bonds to the amount of $163,605 to pay for the acquisition of property necessary for the construction of a 150-ft. boulevard along Scajaquada Creek between Genesee and Greider Sts.

The streets and sewers committee of the City Council of Seattle, Wash., has authorized the grading and curbing of Gilman Ave. and other streets at an estimated cost of nearly $70,000. Other work, to cost over $200,000, is being considered by the council.

A vehicle tax to provide finances for the improvement of the city streets is being urged by members of the Automobile Club of Cleveland, O. It is proposed that this tax shall include all vehicles, and it is estimated that the annual income from it would amount to $400,000.

The construction of an automobile driveway along the line of Summit Ave. between Lexington and the River Boulevard in St. Paul, Minn., is being considered by the Association of Commerce of that city. Tentative plans provide for a 36-ft. automobile driveway paved with asphaltic concrete on a 5-in. concrete base, in the center of the avenue.

The Police Jury of Calcasieu Parish, La., has passed a resolution to call a special election for Aug. 9 for the purpose of voting on the question of issuing $900,000 in bonds, the proceeds to be used for highway improvement. This action was taken upon recommendation of a committee appointed by the Police Jury in March of the current year. The jury has also passed a resolution to engage a parish engineer to have charge of all public work and direct the expenditure of public improvement funds.

Mayor H. M. Schriver of Moline, Ill., has given orders that in the future water services and sewer connections must be installed by property owners in unpaved streets before the work of paving is commenced. Those who do not comply with these instructions will be compelled to do without water and sewer service, as tearing up of paved streets will not be permitted. Owners of vacant lots located on streets where paving is contemplated are instructed to have water and sewer connections put in as far as the curbing.

Fifth Avenue, New York City, to be Repaved

Bids are being advertised for repaving sections of Fifth Ave., New York City, with sheet asphalt. The contemplated work has been divided into three contracts, the first covering the section between Washington Sq. and 23d St., the second between 23d and 34th Sts., and the third between 34th and 42d Sts. Contracts for the first and third sections will be awarded during the coming week. Bids have not been asked for the middle section because the Board of Water Supply has not yet announced its course of action in the matter of laying high pressure mains. Public service companies have been notified that they must make all necessary repairs to pipes, ducts, conduits, etc., before the work of repaving commences, in order that disturbance of the new pavement may be avoided as long as possible.

New Mountain Route in Washington

County Engineer Roy M. Thompson of Pierce County, Washington, has located a new route from the City of Tacoma to Mount Tacoma, which he states is more feasible and less expensive than the proposed road which has been laid out by way of Cardonado and Melmont. The new route, which is designated as the northern route, will have a 4 per cent. grade from the city to the mountain, and will reduce the distance over present practicable routes by one-half.

The new route will also eliminate four miles of canyon, and its construction will cost $40,000 less than the Cardonado and Melmont route, according to Engineer Thompson's present estimate. It is stated that the road, if built will enable automobilists from the city to reach the mountain in 1½ hours. The distance is 28 miles, being but two miles longer than an air-line course.

Street improvements involving a total expenditure of over $100,000 were either contracted for or ordered by the City Council of Tacoma, Wash., during the week ending June 14.

Contracts were recently awarded in Hillsboro, Tex., for the paving of seven blocks of the city streets with rock asphalt, three with Hassam and two with Thurber vitrified brick, the total expenditure involved being between $70,000 and $75,000. The entire cost of this work is to be borne by the citizens.

Acting on the recommendation of the County Commissioners of Duval County, Fla., the City Council of Jacksonville has had a survey made of Main St., between Evergreen Ave. and Trout Creek, with a view to widening the thoroughfare. The County Commissioners made the recommendation at the instance of the Main Street Improvement Association. The plan is now being considered by the County Commissioners and the County Engineer.

At a recent meeting of the executive committee of the Chamber of Commerce of Sacramento, Cal., it was decided that in the future the organization should take an active interest in the good roads movement in the vicinity of Sacramento. Steps have been taken to form a local branch of the California State Automobile Association, of which there are about 150 members in the county and city of Sacramento. The local membership is not organized, and the Chamber of Commerce has decided to appoint a permanent highway committee of its members to assume leadership of the Sacramento County division of the state association. The object of these arrangements is "to promote the improvement of the highways; to encourage proper legislation; to further all good roads projects; to protect the legitimate interests of members, and to affiliate or associate with itself similar associations."

Extensive Repairs to New York State Highways

The State Commission of Highways of New York is advertising for bids for repair work on 118 separate sections of highways in 27 counties. A large number of the items call for entire resurfacing, while in others various surface treatments are specified.

Bids will be opened Aug. 4 at the offices of the commission, 55 Lancaster St., Albany.

Highway Bonds Voted in Kern County, California

Bonds to the amount of $2,500,000 were voted July 8 in Kern County, Cal., for the purpose of improving 327.5 miles of highways under the highway commission law of 1907. The proposed system will radiate from Bakersfield, the county seat, and will connect with the projected north and south state highway, which will pass through Bakersfield.

According to C. R. Sumner, Chief Engineer of the Kern County Highway Commission, the contemplated work will comprise the grading of 92 miles of mountain road and the constructing of 172.1 miles of heavy pavement and 63.4 miles of light pavement. Bridges and culverts will be of reinforced concrete.

It is expected that the work of construction will be well advanced by the coming winter.

MEETINGS

Annual Convention of the Intermountain Good Roads Association

The fourth annual convention of the Intermountain Good Roads Association, held at Boise, Idaho, June 10-12, was attended by several hundred delegates and visitors from Idaho, Montana, Nevada and Wyoming.

The program as carried out follows:

Morning session, June 10, address of welcome, Hon. Arthur Hodges, Mayor of Boise; President's address, J. A. Hendrickson; appointment of committees; paper, "Workings of Highway District Law in Idaho," Otto G. Reinhardt, Commissioner, Napa Highway District. Afternoon session, address of welcome, Hon. John M. Haines, Governor of Idaho; paper, "National Highways," Charles Henry Davis, President, National Highways Association; reports of committees; address, "Union Memorial Highway—The Eighth Wonder of the World," H. S. Earle, Detroit, Mich. Evening session, entertainment and smoker given to delegates by the Boise Commercial Club at White City Park and Natatorium. Reception and entertainment in honor of visiting ladies at Commercial Club rooms.

June 11, morning session, paper, "Good Roads Legislation," Hon. Charles F. Koelsch; paper, "Roads That Lead Somewhere," A. G. Bachelder, Chairman, Executive Board, American Automobile Association; address, "The Midland Trail," Hon. Elias M. Ammons, Governor of Colorado. Afternoon session, address, "Convict Labor on State Roads," Hon. Tasker L. Oddie, Governor of Nevada; address, C. H. Claudy, Director Publicity, National Highways Association; address "National Highways and Good Roads Everywhere," Jesse Taylor, President, Ohio Good Roads Federation; illustrated address, "Good Enough Roads for the Traffic," H. S. Earle, Detroit, Mich. Evening session, illustrated address, "The Modern Day Road Question," B. H. Burrell, Engineer, U. S. Office of Public Roads; illustrated address, "Good Roads," Frederick Vining Fisher.

June 12, morning session, paper, "Construction of Earth Roads," Prof. R. R. Lyman, University of Utah; paper, "Good Roads and Their Relation to Mining," Hon. James H. Hawley, ex-Governor of Idaho; address, Elias Van der

Horst, C. E. Afternoon session, address, "A Plan for Organization," Jesse Taylor, President, Ohio Good Roads Federation; paper, "The Overland Trail," Hon. Joseph M. Carey, Governor of Wyoming; illustrated address, "Scenic Idaho," Prof. W. H. Olin, University of Idaho; paper, "The Part Machinery Plays in the Building of Good Roads," E. L. Lathrop, road expert, J. I. Case T. M. Co., Racine, Wis. Evening session, illustrated address, "Benefits of Modern Roads and What to Build," B. H. Burrell, Engineer, U. S. Office of Public Roads; paper, "Good Roads and Railroads," Douglas White.

Resolutions were adopted expressing commendation of various good roads projects and movements throughout the country; recommending the establishment in state universities and agricultural colleges of short highway engineering courses and suggesting that representatives of the institutions be directed to give instructions in road improvement to counties when so requested; recommending that all the vice presidents of the Intermountain Good Roads Association, who comprise the chairmen of all the boards of county commissioners in the 5 states represented in the association, provide a sufficient number of road drags to drag all the main traveled roads in the respective counties and make reports of the cost at the next meeting of the association; recommending legislation for uniform road laws for each state; endorsing convict labor in road construction, and demanding the opening of all national parks to motor-driven vehicles.

An expression of thanks to the several participants in the proceedings was voted.

COMING MEETINGS

July 22-25.—League of Wisconsin Municipalities.—Annual Convention, Neenah, Wis.

July 30—August 1.—North Carolina Good Roads Association.—Annual convention, Morehead City, N. C. Secretary, Dr. Joseph Hyde Pratt, Chapel Hill, N. C.

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February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

A meeting will be held at Canton, O., July 29, for the purpose of organizing an auxiliary to the Ohio Good Roads Federation. The meeting will be held in the rooms of the Canton Business Men's Association and under the auspices of that organization.

PERSONAL NOTES

George Luther has been appointed Street Commissioner of Poplar Bluff, Mo., for a term of 2 years.

George Schafer of New York, N. Y., has been appointed Superintendent of Highways of Livingston County, N. Y.

J. D. Whitmore has been appointed Borough Engineer of Whangaree, New Zealand. Mr. Whitmore was formerly City Engineer of Moose Jaw, Sask.

George Smith has been appointed Town Engineer of Midland, Ont. Mr. Smith was formerly Town Engineer of Lindsay, Ont.

Ira B. Mullis of Lumberton, N. C., has been appointed Highway Engineer of Yancey County, N. C. Approximately 75 miles of gravel and macadam roads will be constructed under his direction.

James H. Sturtevant, Second Deputy in charge of maintenance and repair with the New York State Department of Highways, has been transferred from that office to the position of Division Engineer. Paul Schultze, Third Deputy, succeeds Mr. Sturtevant.

W. S. Kellar, State Highway Engineer of Alabama, L. D. Smoot, Chief Engineer of Jacksonville, Fla., and J. T. Voshell, Senior Highway Engineer, U. S. Office of Public Roads, have been elected members of the American Society of Civil Engineers. Arthur Cooksey, Principal Assistant Engineer, Paving Commission, Baltimore, Md., E. W. James, Chief Inspector, U. S. Office of Public Roads, L. M. Jones, City Engineer of Port Arthur, Ont., J. J. Murphy, engineer to the Commissioner of Parks and Boulevards, Detroit, Mich., and J. D. Stevenson, Assistant Engineer, Division of Bridges, Department of Public Works, Pittsburgh, Pa., have been elected Associate Members.

NEWS OF THE TRADE

The E. I. Dupont de Nemours Powder Co. has compiled and published in book form a history of the development of the company and its industries since its incipiency in 1802. A brief resume of the evolution of explosives for various uses is included. The volume comprises 224 pages of text and illustrations and is bound in "fabrikoid," manufactured by the company.

The Concrete Steel Engineering Co., Park Row Bldg., New York City, has been engaged to design a new concrete arch bridge over West Canada Creek, Herkimer, N. Y. The structure will consist of 4 arches with a total length of approximately 650 ft., and will replace a steel bridge destroyed in the floods of last spring. The company has also been retained as consulting engineers by the Water Board of Watertown, N. Y., in connection with designing a new concrete arch bridge over Black River in that city.

The Union Iron Works are distributing literature describing the line of road builders' and contractors' equipment manufactured by the firm. Catalog No. 20 covers "Union" portable tar and asphalt heating kettles, combination tar and gravel heaters, 2-wheel heating kettles, portable repair kettles, asphalt kettles, fire wagons, gravel heating pans, dippers and pouring pots, hand rollers, etc. It comprises 16 pages and cover, 7 ins. by 10 ins., and is illustrated throughout. Bulletin No. 21 is devoted to a description of the "Eldus" distributor for applying hot asphalt and oil by the penetration method in macadam road construction. The bulletin comprises 12 pages of the same size as Catalog 20.

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Chicago to Connect Boulevard Systems

The city council of Chicago, Ill., has voted favorably on the question of connecting the north and south side boulevard and park systems by widening Michigan Avenue and Pine Street, between Randolph Street and Chicago Avenue. This plan, which has the indorsement of Mayor Carter Harrison, has been under consideration for eight years.

The plan provides for widening Michigan Avenue to 127½ ft. by acquiring property on the east side, Pine Street will be made 145 ft. wide by taking 75 ft. of land on the west side of the street. The ends of the two thoroughfares will be joined by a double-decked bridge over the Chicago river. The upper part of this structure will be used by automobiles, pleasure vehicles and pedestrians and the lower by commercial vehicles and heavy traffic. A plaza 222 ft. square will be constructed at each end of the bridge.

The entire cost of the improvement is estimated at $7,000,000. It is proposed that of this amount $2,225,000 will be paid from the proceeds of a bond issue, which will be submitted to the voters for approval at an election to be held next April. The rest of the cost will be raised by special assessments levied on the properties benefited and the general tax list in proportions to be determined by a commission appointed for this purpose and to estimate the damages from condemnation.

It is hoped to advance the preliminary proceedings so that the actual work on the improvement may be commenced next May. It is estimated that two years will be required to complete the work.

The ordinance passed by the city council has the approval of the Chicago Plan Commission and the Board of Public Works. That of the La Salle County Court must be secured before definite action can be taken.

State Highway Plans in Minnesota

The several boards of county commissioners of Minnesota are considering plans prepared by the State Highway Commission calling for the construction of a system of gravel roads comprising a total of 7,200 miles, connecting different points throughout the state.

State roads previously designated in most of the counties, embracing an aggregate of about 17,000 miles, were proposed without regard to system on whether or not the counties could ever build them, according to a statement by State Engineer George W. Cooley. For this reason it is considered advisable to revise the plans and lay out a system with limited mileage that it is possible to build. The new plan suggested by the State Highway Commission incorporates about 30 per cent. of the old state road designations, requiring new designations of about 2,100 miles.

Under the present highway law, townships take no part in the state road construction or maintenance. In preparing the new plans care has been taken to exclude from the system many roads designated in the old maps as state roads, which the townships may wish to take over.

The work of construction of the proposed system will cover a period of three years. During this time it is estimated that there will be available for state road work approximately $10,500,000, of which sum $2,000,000 is expected yearly from the counties and $1,500,000 each year from the state aid fund. With this amount of money it will be possible, if considered desirable to extend the state road system so that it will embrace 10,000 miles of gravel roads costing $1,000 per mile.

A blueprint map of the proposed system has been forwarded to each county auditor and the county boards of commissioners have been asked to lay out limited mileages of roads in their respective counties, conforming as far as possible to the general system prepared by the State Highway Commission. When the county boards have all returned their suggestions, the entire system will again be revised.

Grade Crossing Elimination in New York City

The Public Service Commission for the First District, State of New York, through its Secretary, Travis H. Whitney, has written a letter to Governor Sulzer urging him to approve appropriations for grade crossing elimination which may be made by the State Legislature.

The communication to the Governor calls particular attention to conditions along the line of the Atlantic Division of the Long Island Railroad, between Flatbush Avenue, in the Borough of Brooklyn, and Jamaica. A statement is presented showing that 16 people have been killed and many others struck by trains and injured on that division since the Public Service Commission came into office, July 1, 1907. At present there are 24 crossings on the division, but it is stated that this number ultimately will be increased to 40 as several streets now approach the railroad on each side, but have not yet been opened across the tracks.

The cost of eliminating these crossings is estimated at approximately $5,112,100, of which the state's share would be $1,278,025, and that of the city an equal amount, while the Long Island Railroad would be called upon to pay $2,556,050. It is stated that the railroad company is willing to pay its share of the expense. The necessity of appropriating sufficient funds to eliminate all the crossings on this division at once is urged, as they are so close together it would be impossible to work on a part without taking care of them all at the same time.

The total number of grade crossings in Greater New York is 477. Of these, 201 are in the Borough of Queens, 113 in Richmond, 103 in Manhattan, 57 in Brooklyn and 3 in the Bronx.

Governor Sulzer has already vetoed appropriations made by the legislature amounting to $600,000, of which $325,000 was asked by the Public Service Commission for the First District.

New Highways in Koochiching County, Minnesota

Viewers appointed by the Board of County Commissioners of Koochiching County, Minn., to determine the benefits and damages to lands along the routes of three proposed new county highways, commenced work July 15. As soon as their reports are filed, which must not be later than Aug. 5, bids will be asked for the work, the cost of which is estimated at $250,000.

One of the proposed roads will run from International Falls, the county seat of Koochiching County, to the Beltrami County line, east of Northome, a distance of 83 miles. The second highway will run from International Falls to the St. Louis County line, east of Ray, 22 miles, and the third, five miles in length, will extend from International Falls to the Beltrami County line near Baudette, following the course of the Rainy River.

The highways will be constructed under the terms of the so-called Elwell highway law enacted at the last session of the State Legislature.

The City Council of Billings, Mont., has decided to reduce the width of the roadways of various streets in the residential section of the city to provide room for parkings and other features.

Residents of Alexander Ave., Canton, O., have petitioned the city council for permission to pave that street at their own expense under the direction of the City Engineer.

The State Highway Commission of Minnesota has approved the construction of 89 miles of new highways in Beltrami, Carlton and Olmstead Counties at a cost of $151,578. The commission has also approved three miles of concrete road in Hennepin County.

The voters of Spartanburg, S. C., have authorized a bond issue of $100,000 for paving streets and constructing sidewalks. It is estimated that the combined expenditures for street improvement during the coming year, including those of the city, the property owners and the street railway company, will amount to $400,000.

The Board of Control of Winnipeg, Man., is considering the feasibility of widening Livinia Ave. The thoroughfare is so located that it will eventually become a business street, but is so narrow at present that it is unavailable for heavy traffic. It is estimated that the cost of widening would amount to about $100,000.

Street Work in Rochester, New York

Street paving contracts calling for a total expenditure of $326,566.30 were awarded by the Board of Contract and Supply of Rochester, N. Y., during the first six months of the current year. Work on all of these contracts, which provide for improving sections of 31 different streets, has been started and in some cases nearly finished.

Among the more important improvements under way are the paving with wood block of Oxford St. at a cost of $20,330; resurfacing Lake Ave. at a cost of $50,388; resurfacing Portland Ave. at a cost of $32,721, and repairing the asphalt pavements of the city, the contract for which was let to one firm at $48,000 for the year.

In addition to the contracts already awarded and on which work has begun, plans are being prepared for street improvement which will bring the total expenditure for the year to more than $500,000.

The amount of money involved in the contracts awarded up to June 30 is larger than has been expended by the city for this purpose in any entire previous year.

The Streets Committee of the City Council of Detroit, Mich., has confirmed contracts for the paving of 27 streets.

The City Council of Cambridge, Mass., has passed an order appropriating $82,700 for street paving.

New plans and specifications for the Q St. bridge over Rock Creek, Washington, D. C., are being prepared, and it is expected that bids for the work of construction will be asked about Sept. 1.

The Madison Co., Mo., Board of Supervisors has authorized the construction of 240 miles of hard surfaced roads at a total cost of $2,880,000. Under the provisions of the new state highway law the state will pay one-half the amount.

The voters of the road precinct of which Tyler, Tex., is the center, have authorized a bond issue of $300,000 for the purpose of building a system of roads in the area within a radius of 10 miles from the city.

Citizens of Duncan and Comanche, Okla., recently spent a day working on the highway between the two towns. It is stated that 150 men and 40 teams from Duncan and 100 men and 35 teams from Comanche were engaged on the road during the day.

The Board of Estimate and Apportionment of New York City has approved the proposed widening of Lafayette Ave., Borough of Brooklyn, between Fulton St. and Flatbush Ave. The width of the roadway will be increased from 30 to 50 ft., and the sidewalks will be made 20 ft. wide.

Governor Major of Missouri has issued a proclamation designating Aug. 20 and 21 as "good roads days," and requesting every able-bodied man in the state to devote those two days to work on the roads. The women of the state are asked to provide lunches for the workmen.

The city of Manhattan Beach, Cal., is planning to expend $350,000 in the improvement of streets. The most important project under consideration is the paving of Highland Ave., running north and south through the city on the line of the Playa del Rey-Redondo Beach automobile boulevard, a portion of which is already completed. The improvement of Highland Ave. will add two miles to the boulevard.

To Build Post Road in Maine

The Governor and Council of Maine have decided to take advantage of the federal government's plan to assist the states in the improvement of post roads for the use of rural free delivery mail carriers, and have voted to appropriate the sum of $100,000 for the state's share of the expense, which is two-thirds of the entire amount.

The road selected for improvement runs from Portland to Bath by way of Falmouth, Cumberland, Yarmouth, Freeport and Brunswick, a distance of 35 miles.

The Maine Legislature, at its last session, appropriated $20,000 for the improvement of post roads in conjunction with the national government and designated a route between Portland and Fryeburg, by way of Naples, Casco, Raymond, Wyndham and Westbrook. This route, however, was not accepted by the Post Office Department and the road from Portland to Bath was decided upon. The $100,000 appropriated by the Governor and Council includes the $20,000 set aside by the Legislature, $50,000 from the annual state highway appropriation and $30,000 from any unapportioned balance of the automobile license fund. If the latter fund does not provide $30,000, the amount lacking will be taken from funds appropriated for use on state highways.

Bonds to the amount of $100,000 have been voted in Hernando County, Fla.

Arrangements have been made by the County Commissioners of Cooke County, Tex., for the construction of three bridges over different streams of the county.

The portable paving plant belonging to the state of Nebraska is transported on what is stated to be the longest single car on any railroad in the world. The car is over 90 ft. long and with the plant aboard weighs 176,000 lbs.

A petition signed by over 75 per cent. of the property owners on the state road between Salem and Westville, Ohio, asks for the paving of that road between the two points. The distance is 7 miles. It is proposed that the road be paved 18 ft. wide, except through the town of Damascus, where a width of 30 ft. is asked.

The Board of Park Commissioners of East St. Louis, Ill., has awarded the contract for the construction of the North Boulevard, which will be the first of a proposed series of boulevards connecting various parts of the city. The contract price for the North Boulevard is $104,993.70. The work will be done by the Dunlap-Lippold Construction Co.

July 27 has been designated as Good Roads Day in Boone County, Mo. It is expected that between 500 and 1,000 men will work on a 25-mile section of cross state highway on that day. Members of the Columbia Automobile Club have volunteered the services of their automobiles to transport workers to any part of the highway where they are needed.

The Topographical Survey of Baltimore, Md., has approved ordinances authorizing the opening, in Woodberry, a suburb of the city, of a new thoroughfare to be known as the Mills road, and also a thoroughfare in West Baltimore known as Monastery Ave. Mills road will extend from the intersection of Chestnut Ave. and 23rd St. to Woodberry Ave., connecting the suburbs of Woodberry and Hampden, and Monastery Ave. will connect the old and new roads to Frederick.

Good Roads Exhibits at Ohio State Fair

A road exhibition will be included in the Ohio State Fair at Columbus next fall. About 12,000 sq. ft. of floor space will be utilized for the purpose, according to present plans.

The Ohio State Highway Department will occupy about 1,200 sq. ft. with an exhibit showing samples of native road building material and demonstrating methods of building and maintaining dirt roads. Attention will also be given to road engineering and plans, and daily lectures will be given on these subjects. Among the other exhibitors will be the U. S. Office of Public Roads, which has arranged to send an exhibit and to provide a lecturer, the National Paving Brick Manufacturers' Association, which will have an exhibit occupying about 1,050 sq. ft., and the Interstate Stone Manufacturers' Association, which has contracted for a similar amount of space. The latter organization is preparing to show the products of its members by means of miniature roadways.

Another section will be occupied by an exhibit of concrete road materials.

Highway improvement bonds to the amount of $175,000 issued by Fort Bend County, Texas, have been purchased by E. B. Blanton of Gainesville. The work for which the bonds were issued will be commenced at once.

At a recent meeting of the Rotary Club, Salt Lake City, Utah, a resolution was adopted favoring the proposed $1,000,000 bond issue for the improvement of Salt Lake County roads, and pledging the support of the members of the organization, providing the work be done by contract under the supervision of a "competent expert of experience and recognized standing."

An ordinance is being considered by the Board of Public Works of Paterson, N. J., providing that all sidewalks in the city shall be of either concrete or bluestone flagging, and that those within the limits of the old fire district shall be constructed the full width of the sidewalk area. Sidewalks on certain main thoroughfares outside the fire district must be 7 ft. wide and on all others 5 ft. The ordinance has passed first reading and will be presented for final passage at the regular meeting of the board in August.

MEETINGS

Ozark Trail Association Organized

At a meeting held at Monte Ne, Ark., July 11, attended by delegates from Arkansas, Oklahoma, Missouri and Kansas, an organization known as the Ozark Trail Association was formed with 300 charter members.

The object of the association is to promote the construction of 1,500 miles of improved roads in the four states represented. The plans provide for raising an annual sum of $5,000 through dues and membership fees, of which amount $2,000 will be given in prizes each year for the best examples of road construction within the territory embraced by the organization. This territory will be divided into ten or twelve sections, each division to have a road, marked every half mile with a white sign bearing the words, "Ozark Trail." The proposed routes will extend west to Oklahoma City, Okla., and Wichita, Kan., south to Rogers, Ark., and east to Monte Ne, Ark.

At the Monte Ne meeting addresses were made by M. J. Kelley, President of the Commercial Club of Neosho, Mo., Col. Sidney Suggs, State Highway Commissioner of Oklahoma, Col. W. H. Harvey of Arkansas, Charles W. Fears of Joplin, Mo., editor of the "Southwestern Automobilist," and others.

The following officers were elected: President, M. J. Kelley of Neosho, Mo.; Secretary, Charles W. Fears of Joplin, Mo. In addition the following Vice Presidents, one from each state represented in the association, were elected: Arkansas, W. H. Harvey; Oklahoma, Charles Churchill of Vinita; Kansas, W. J. Caney of Chanute; Missouri, Charles Fleming of Monett. The President and Vice Presidents form the Executive Committee.

It is announced that the association will hold semi-annual meetings. The next probably will be held at Joplin, Mo.

The Rappahannock District Good Roads Association of King George County, Va., was organized at a meeting recently held at Fredericksburg. The following officers were elected. President, W. A. Rose; Secretary and Treasurer, G. O Taylor. An Executive Committee of 18 members was also appointed.

A meeting of the business men of Colfax, Cal., was held July 13 in the interest of a proposed state highway between Auburn and Emigrant Gap, via Colfax, Gold Run and Dutch Flat. J. M Newman was chairman of the meeting and O. E. Williams secretary. A committee was appointed to confer with the state highway officials, and to prepare data showing the advantages to be gained by the construction of the highway.

A good roads rally was held at Naylor, Ark., July 11, in the interest of a proposed new road leading from Conway to Mount Vernon, Enola, Bristol, Naylor and other points in the northern and eastern parts of Faulkner County. D. O. Harton of Conway was Chairman of the meeting, and E. E. Jones of Mount Vernon was Secretary. Addresses were made by various county officials and others, and committees were appointed to solicit subscriptions.

An organization known as the Summitt Avenue Boulevard Association was formed July 11 at a meeting held in the rooms of the St. Paul, Minn., Commercial Club. The object of the association is to promote the paving of Summitt Ave., its proper maintenance after improvement, and the restriction of traffic on the thoroughfare. C. B. Gedney was elected President of the association, J. J. Corneveaux, Vice President, and Price Wickersham, Financial Secretary.

COMING MEETINGS

July 30—August 1.—North Carolina Good Roads Association.—Annual convention, Morehead City, N. C. Secretary, Dr. Joseph Hyde Pratt, Chapel Hill, N. C.

August 11-13.—North Carolina League of Municipalities.—Annual meeting, Wrightsville Beach, N. C.

August 11-13.—Pacific Highway Association.—Fourth Annual Convention, Vancouver, B. C. Secretary, Frank M. Fretwell.

September 29-October 4.—American Road Congress.—Annual session, Detroit, Mich. Secretary J. E. Pennybacker, Colorado Building, Washington, D. C.

October 7-10.—American Society of Municipal Improvements.—20th Annual Meeting, Wilmington, Del. Secretary, A. Prescott Folwell, 15 Union Square, New York, N. Y.

November 10-15.—United States Good Roads Association.—Convention, St. Louis, Mo. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

December 9-12.—American Road Builders' Association.—10th Annual Convention, First Regiment Armory Bldg., Philadelphia, Pa. Secretary, E. L. Powers, 150 Nassau St., New York, N. Y.

February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

The officers and executive committee of the Interstate Cement Tile Manufacturers' Association, the National Association of Sand and Gravel Producers, and the Illinois Association of Municipal Contractors are planning to hold the annual conventions of the several organizations at Chicago, Ill., during the period of the Chicago Cement Show in February, 1914.

Letters have been sent out by the Bexar County (Tex.) Highway League to commercial organizations of towns along the line of the Southern Pacific railroad, between San Antonio and the western state line, proposing that a meeting be held at Del Rio, Aug. 20, for the purpose of discussing plans for the construction of a highway between San Antonio, Tex., and San Francisco, Cal.

PERSONAL NOTES

Geo. T. Bacon has been appointed General Manager of the Owego Bridge Co., Owego, N. Y.

C. H. Bacon has been appointed Chairman of the Pike Commission of London County, Tenn.

Charles H. Kline has been appointed City Engineer of Dayton, O. Mr. Kline was formerly Acting City Engineer.

Edgar T. Duncan, First Assistant Engineer in the City Engineer's office of Hartford, Conn., has resigned.

W. E. Dozier, City Engineer of Temple, Tex., has resigned and will become General Superintendent and Chief Engineer of the Temple, Northwestern & Gulf Railway.

Walter F. Wilson has been appointed Third Deputy in charge of the Bureau of Town Highways with the New York State Department of Highways. Mr. Wilson succeeds Paul Schultze, recently advanced to the office of Second Deputy.

James Nisbet Hazlehurst has been engaged to superintend the work of paving all the streets of the city of Miami, Fla. According to the contract Mr. Hazlehurst will receive as fees an amount equal to 5 per cent. of the cost of the work.

The following have been appointed members of the Cocke County, Tenn., Pike Commission: J. W. Kyker, Chairman, Charles O'Dell, J. W. Hartzell, J. D. Holdway and James F. Neas. The commission was appointed to supervise the maintenance of the pike roads of the county.

J. Edgar Borden has been appointed City Engineer of Fall River, Mass., succeeding Philip D. Borden, whose resignation after 40 years of service in that office was noted in a recent issue of "Good Roads." J. Edgar Borden was formerly Assistant City Engineer.

J. Edgar Thompson, City Engineer of Knoxville, Tenn., since 1910, died in that city July 9. Previous to his appointment as City Engineer Mr. Thompson served as Assistant City Engineer of Knoxville for two years. He was also at one time City Engineer of Birmingham, Ala., for a period of about six years.

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THE LONDON ROAD CONGRESS

As regards attendance, the exhibition, the thoroughness with which the subjects under consideration were covered by the papers, and the entertainment provided, the Third International Road Congress at London last June surpassed either of the two previous international meetings.

Considerable space is given in this issue to a report of the congress, in which an account of the proceedings from day to day is given in as much detail as space permits. The full text of the conclusions is also presented, as is one of the papers. The paper is by Geo. W. Tillson, Consulting Engineer to the President of the Borough of Brooklyn, New York, who, as an authority on matters pertaining to roads and streets, needs no introduction.

The attendance at the congress cannot be given exactly because of the lack of a thoroughly efficient method of registration, but it is estimated to have been about 2,500. Although at first thought more delegates might be expected to have been present at the congress, which was one of a series of meetings international in character and held at intervals of three years, the number present must have been gratifying to the officials in charge, since the congress was held at a time of the year when most engineers are the busiest and since many of those who attended had to come from long distances. It should also be borne in mind that the attendance was made up of men ranking high in road building circles in their respective countries—if, as is beyond question the case, the delegations from all of the countries were of the character of that from the United States. It is to be regretted that the system of registration was not more efficient, as it would have been of real advantage to have had a complete list of the delegates, showing their correct names, occupations, titles and addresses.

The commercial exhibits included the principal road and street building equipment used in England as well as considerable such equipment from other countries. The exhibits of materials were perhaps even more comprehensive than those of machinery, and the non-commercial exhibits proved of especial interest as showing to delegates from other countries the methods and materials in use in England. From the American point of view, it was something of a disappointment to find that American products were not more largely represented.

For the entertainment provided, the British officials of the congress having the matter in charge deserve the highest praise. The delegates were received with a hospitality which left nothing to be desired and were accorded every courtesy which it was possible to show them. The receptions tendered them were all brilliant affairs at which the finest entertainment procurable was furnished, and the courtesy and kindness shown by the English officials and engineers will be one of the pleasantest memories of the congress.

The most adverse criticism that can be made of the Third International Congress is that the number of papers was too large to permit of thorough discussion, especially under the unavoidable difficulties arising from the fact that the delegates spoke several different languages. The division of the subject into sections, sub-sections and questions was both orderly and logical, and had all or part of the ten communications been omitted or combined in some way with the eight questions and had the number of reports been considerably reduced, probably no trouble would have been experienced in completing the work which had been mapped out for the sectional meetings. As it was, no time was available for the discussion of the communications, some of which were of quite as much importance as some of the questions. This matter was realized by the officers of the Permanent International Commission. As noted elsewhere, at the meeting of this organization General Secretary Mahieu pointed out that the number of reports was excessive and that in future it would be better to limit the number to about a dozen subjects, questions or communications. This, he argued, would be more advantageous for financial reasons and would make it possible to send out the reports to the members of the congress at an earlier date.

Another advantage of reducing the number of reports would be that it would then be possible to place a larger proportion of the papers before the vast majority of highway engineers—who are not members of the Permanent International Association. At present, only members receive these, and because of the length of the individual reports and their great number it is impossible for any technical journal to print more than a comparatively small part of them. Even the abstracts of the papers prepared by the several general reporters would require more space than any publication in the field of highway work could devote to them. The result is that only a very limited number of those who are interested in the work of the congress are able to have before them either the papers or abstracts which are complete enough to be of much service. In handling this matter, "Good Roads" will print, in future issues, such of the general reports—either in full or as abstracts—as space permits. It is believed that the brief abstracts of the separate reports which are contained in the summaries by the general reporters will be of more value to engineers than would complete papers selected from those presented.

The conclusions or resolutions adopted by the congress may be taken to represent the consensus of opinion among the various delegates. As these came from many different countries, in each of which engineering practice and the conditions under which engineers must work are different from those in other countries—in some cases very different—it might reasonably be expected that agreement would be had only upon general principles—perhaps even to the extent of being little more than statements of the obvious. Though this criticism might, perhaps, be made of some of the findings of the congress, it is worthy of note that in some cases very definite conclusions have been drawn. It is also interesting to note how closely the results as a whole set forth principles very nearly in accordance with American practice.

To American engineers generally, the most regrettable feature of the whole congress is the fact that the United States was not represented by official delegates, and this is, of course, the fault of the Government and not of the congress officials. Although, in spite of the lack of such representation, the influence of American engineers was evident throughout the deliberations of the congress, it was, nevertheless, humiliating to delegates from this country to feel that the United States had no official standing in the congress. This was especially so in view of the fact that among the countries represented were not only all of the world powers, but such governments as those of Algeria, Bulgaria, Chile, Colombia, Cuba, the Leeward Islands, Monaco, New South Wales, New Zealand, Persia, Siam, Sierra Leone, Switzerland, Tunis and Uruguay. It is to be hoped that before the next international congress the United States Government will take steps to have this country officially represented.

AESTHETIC DESIGN

That an engineering work—be it a bridge structure, a road or a street—should be so designed as to render the maximum service at the minimum cost is recognized as the fundamental principle of engineering. That in the work of planning due weight should also be given to attractive appearance is not so generally considered the duty of the designer, though it should be so regarded.

The desirability of designing with regard to aesthetic as well as to utilitarian features is nowhere greater than in the planning of roads and streets. A building, or even a bridge, occupies one particular place and is, under ordinary conditions, visible from only a comparatively small area. A road, on the other hand, extends across the country for mile after mile and, as soon as it is built, becomes a definite part of the landscape—and to those passing over it the most conspicuous part.

As pointed out by Nelson P. Lewis in his paper on the planning of road and street systems, printed in the July 5 issue of this journal: "While the primary function of the road may be to afford facility of movement from place to place, the interest of road users is not limited to the quickest possible arrival at their destination." Mr. Lewis further points out that roads are being used more and more by those whose object is recreation and pleasure. To such users the appearance of the road is of great importance, and since their numbers are so large it is only right that out of regard to them, if for no other reason, the roads be made as attractive as possible.

The plea for the designing of roads with regard for their attractiveness is not a plea that they be constructed and maintained with the same care for the aesthetic as is manifested in the building and keeping up of park and cemetery roads or roads in private estates. It is, however, entirely possible for those who have under their supervision the improvement of roads to make reasonable provisions for their beauty without incurring prohibitive expense. It costs little, if any more, to build a road with pleasing curves than with monotonously long tangents, nor is it excessively costly to trim rough embankments and build guard rails that will be ornamental as well as effective safety devices. Much also can be done at reasonable cost in thinning trees and underbrush to open up attractive views and in screening from sight unattractive views along the road by leaving existing trees or shrubbery standing, or even by planting.

The same principle is equally applicable to the building of bridge structures. A bridge of long span is a conspicuous structure in almost any location, and even a short bridge or a culvert is seldom so situated as to remain unnoticed. The cost of building a graceful structure in harmony with its surroundings need be but little, if any, more than that of an ugly one, and the opportunities for aesthetic design of these structures are many.

In the ways indicated and by many other means which will suggest themselves to engineers, it is possible to add to the pleasure of the users of the highways without adding appreciably to the burden of cost borne by the taxpayers. The matter is one which may well be given a more important place in the work of road and street planning.

The Board of Chosen Freeholders of Mercer County, N. J., has passed a resolution that in future, the work of hauling, delivering and spreading stone on the county roads will be done by competitive bidding, contracts to be let for doing the work by the year. Bids will be asked per ton mile and multiples thereof, and the delivery will include the spreading of the stone on the road. This action has been decided upon because of the belief that the present method of hiring teams for the purpose is costing an excessive amount.

The Third International Road Congress

The Third International Road Congress was held at London, England, June 23 to 28, as reported briefly in the issue of July 12. Although the method of registration did not furnish accurate figures, the attendance was estimated at about 2,500. The delegates came from all parts of the world and comprised besides many individuals, the representatives of the governments of nations, states, counties and municipalities; public institutions; organizations of various kinds, and private corporations. The congress included technical sessions for the consideration of all phases of road and street work; an exhibition of machinery and materials for the construction, repair and maintenance of roads and streets, and of maps, charts, samples of road sections, vehicles and various other exhibits of interest in connection with road and street work; social functions, and excursions comprising inspection trips to various road and other engineering works and visits to points of interest in England, Scotland and Wales.

The consideration of the technical problems of the organization of governmental departments administering road and street affairs and of the construction, repair and maintenance of roads and streets was divided into two sections, each of which was further subdivided into two sub-sections. A complete schedule of these, together with the names of the authors of reports on each question and communication, was printed in the issue of June 7.

The reports presented numbered 140, of which 76 dealt with the phases of the general subject covered by the nine questions and 64 with the matters covered by the papers designated as "communications." In some cases two or more authors collaborated in the preparation of a report, and as such reports sometimes comprised two or more practically distinct papers, the actual number of separate papers presented exceeded 150.

In order to facilitate and expedite the work of the congress, simultaneous meetings were held by the different sub-sections, certain questions being discussed at each of these meetings. Each of the four sub-sections had its own officers and held its meetings separately and independently, except that the questions and communications of common interest to two sub-sections were discussed at joint meetings of those two sub-sections. In that case the meeting was presided over by an executive committee formed from the executive committees of the two sub-sections, the chair being occupied by one of the sub-section chairmen, designated by the Permanent Council. At each of these sectional meetings, the general reporter for the question under consideration presented to the meeting a brief summary of the reports on that question. The meeting was then thrown open to general discussion, each member desiring to speak being allowed ten minutes and being permitted to address the meeting not more than twice on the same subject. By favorable action by the meeting, however, these restrictions could be removed and a member be given permission to speak more than ten minutes or to address the house more than twice. A speaker was allowed

DELEGATES ASSEMBLED FOR THE FINAL MEETING AT CAXTON HALL ON THE AFTERNOON OF FRIDAY, JUNE 27 —THIRD INTERNATIONAL ROAD CONGRESS.

to use his own language, but was required to have his remarks translated unless he spoke in one of the three official languages of the congress—English, German and French. Because of lack of time, the communications were not discussed. After the questions had been discussed in sectional meetings, conclusions were adopted and one or more reporters were chosen to present them at the final meeting of the congress. At the final meeting these conclusions were discussed and amended if desired, becoming then the official conclusions of the congress.

The excursions scheduled were sixteen in number and were divided into three groups. Group 1 comprised three excursions during the week before the congress; group 2, eight excursions for congress week, and group 3, five during the week following the congress. These excursions, a complete list of which was given in the issue of April 5, proved of great interest to the delegates, as they provided opportunities to inspect a great deal of the road work in England, Scotland and Wales and also to visit many points of general interest in those three countries. The excursions were managed by Thos. Cook & Son, who were designated as the official passenger agents of the congress, and were carried out as scheduled except Nos. 2 and 10. Excursion No. 2 was omitted and, owing to the small number of tickets requested for excursion No. 10, those who had entered were transferred to No. 11 if they so desired. In addition to the excursions scheduled, five additional ones were arranged later.

Monday, June 23

The first formal meeting held in connection with the congress was that of the Permanent International Commission of Road Congresses at the headquarters of the Institution of Mechanical Engineers at 10 o'clock Monday forenoon. Albert de Preaudeau, President of the Commission, who occupied the chair, welcomed the members, referring briefly to the progress made by the association and congratulating those present upon the large attendance. Albert Mahieu, General Secretary of the Executive Committee, called the attention of the members to the large number of reports for the Third Congress, and suggested that in the future it would be better to limit the number of subjects to about twelve questions or communications, thus enabling the reports to be sent out to the members in ample time before the opening of the congress. On a motion by V. E. de Timonoff of Russia, it was voted that the commission meet again this year at Paris with the local organizing commission to draw up a list of questions to be discussed at the Fourth Congress. Messrs. Lewald and Wand, delegates from Germany and Bavaria, then invited the congress, on behalf of the Federal Government and the Royal Bavarian Government, to hold the congress at Munich in 1916 and this invitation was subsequently accepted. Among the other matters passed upon at this meeting was the confirmation of the award of the prize of the Second International Road Congress to Francis Wood, M. Inst. C. E., Borough Engineer and Surveyor of the Fulham Borough Council, London. The commission also voted to increase the grant for research work in the laboratory, audited the accounts for the financial year of 1912 and drew up a list of speakers for the opening meeting.

The Permanent Council met at 11.30 a. m., the principal business before the meeting being the appointment of officers for the sections and sub-sections of the congress. These officers included a general president, an honorary treasurer, a general honorary secretary and a deputy general honorary secretary; a vice president and a secretary from each of the countries represented, and sectional committees for each of the four sub-sections, A, B, C and D, and for A and B combined and C and D combined. Sir George S. Gibb, Chairman of the Road Board, was elected President; Hon. Arthur Stanley, M. V. O., M. P., Chairman of the Royal Automobile Club, Honorary Treasurer; W. Rees Jeffreys, Secretary of the Road Board, General Honorary Secretary, and G. Montagu Harris, Secretary of the County Councils' Association, Deputy Honorary General Secretary. A vice president from each of the countries represented was also elected. The sectional committee of each of the four subsections consisted of one or two presidents and several vice presidents and secretaries. The presidents of the sub-sections were appointed and assigned to occupy the chair during the discussion of certain questions. The names of the presidents chosen and the questions assigned to them were as follows: Section 1, Sub-Section A, Right Hon. Sir J. H. A. MacDonald, K. C. B., P. C., K. C., Lord Justice Clerk of Scotland and a member of the Road Board, Question 3; Section 1, Sub-Section B, Sir Maurice Fitzmaurice, C. M. G., Question 4; Sub-Sections A and B combined, Capt. G. S. C. Swinton, Chairman of the Committee for the Town Planning of Delhi, Question 1; R. Elliott Cooper, President of the Institution of Civil Engineers, Question 2; Section 2, Sub-Section C, W. Joynson-Hicks, M. P., Chairman of the Automobile Association and Motor Union, Question 7, and H. Percy Boulnois, M. Inst. C. E., Question 6; Section 2, Sub-Section D, Hon. Arthur Stanley, M. V. O., M. P., Question 8, and the Right Hon. C. E. Hobhouse, M. P., Chancellor of the Duchy of Lancaster, Question 9; Sub-Sections C and D combined, S. F. Edge, President, Society of Motor Manufacturers and Traders, Question 5.

Americans elected vice presidents and secretaries were as follows:

Vice Presidents—W. W. Crosby, Consulting Engineer, Baltimore, Maryland, Sub-Section A; Nelson P. Lewis, Chief Engineer of the Board of Estimate and Apportionment, New York, N. Y., Sub-Section B; Col. Wm. D. Sohier, Chairman of the Massachusetts Highway Commission, Sub-Section C; Samuel Hill, President of the American Road Builders' Association, Sub-Section D.

Secretaries—Arthur H. Blanchard, Professor of Highway Engineering, Columbia University, New York, N. Y., Sub-Section A; Clifford Richardson, Consulting Engineer, New York, N. Y., Sub-Section B; E. L. Powers, Editor of "Good Roads," New York, N. Y., Sub-Section D.

The congress was formally opened at Wesleyan Central Hall at half past two in the afternoon by the Right Hon. the Chancellor of the Exchequer, Lloyd George, the Honorary President of the Congress.

Before delivering the address of welcome, Mr. Lloyd George proposed sending to the King a telegram conveying the greetings of the congress and the thanks of the delegates for the invitation to visit Windsor Castle. The following telegram was sent:

"The Third International Road Congress, assembled at their inaugural meeting, send loyal and respectful greetings to your Majesty and cordial thanks for your Majesty's gracious invitation to visit Windsor Castle."

Before the close of the session the following reply was received:

"I am commanded to express the King's thanks for the kind message of greeting which His Majesty has received from the Third International Road Congress. His Majesty wishes the congress every success, and is very glad that some of the delegates will visit Windsor.—Stamfordham."

In welcoming the congress, Mr. Lloyd George spoke as follows:

It is now my pleasing task, on behalf, of His Majesty's Government, to welcome the delegates to this International Congress. They are here considering problems of first-class importance to every civilized community, problems affecting the convenience, the comfort, the needs, and even the lives of the people. There are no more important questions to any civilized community than the improvement of the communications in every country.

It is difficult for us to realize how backward even the United Kingdom was in the matter of road communication up to the very end of the eighteenth century. Abroad, military exigencies had forced governments to face the problem of improved road communication, but almost up to the end of the eighteenth century there was hardly a road in the modern sense of the term throughout the whole of this country. There were bridle paths, with deep and dangerous ruts—during the rainy season mere mud baths. They were so narrow that two vehicles could not pass, so low that the rain could not be drained off, and the metaling was so rotten that they were quite impassable if there was any rain. There were hardly any bridges, so that whenever there was a flood communications between two great cities were completely broken off. It took, even in summer, two whole days to get from London to Birmingham, and in winter it took three or four days. That was almost as late as the end of the eighteenth century. Now you have 231,000 miles of about the best roads in the whole of the civilized world. Telford, McAdam and other men to whom we owe a great debt of gratitude, undertook to lay down some of the most magnificent roads in the world. Then came railroads, and many of our roads appeared to fall into desuetude. I am sure those who were taking carriage drives 20 or 30 years ago must have been impressed by the fact that the moment they left a great town, when they got 10 or 15 miles from a great center of habitation, they found hardly anybody on the road at all. Then came the great revolution effected by the pneumatic tire, and the whole of the roads were filled with dust and delight once more. Then came motors. I do not know whether you have read the very remarkable report circulated to this conference. I read it with very great interest. There is nothing more striking in it than the passage showing what has happened even to one secondary arterial road out of London. Twenty or twenty-five years ago, if you had been in that spot, you would probably have found a few light vehicles and one or two heavy carts; ten years ago, perhaps a long stream of bicycles. But on a Sunday morning they took the statistics of that road in a single hour, and really the figures are so remarkable that I need not apologize for calling attention to them—100 bicycles, 50 motor bicycles, 50 motor 'buses, 300 motors, and 15 horse-drawn vehicles. If you went there on Monday morning, in addition to that, we should find a number of heavy motor delivery vans.

That is a revolution in the roads of this country, and the result has been that you have got in this country now 220,000 motor vehicles. I think that is twice as high as the nearest country in Europe, but only one-third of the number in the United States. What has been the effect? That the question of road making has once more become an important economic and financial question for the consideration of the country, especially financial. And it urgently presses upon engineers, presses upon municipalities, presses upon governments, and presses especially upon ratepayers. In 1892 the roads of England and Wales cost to maintain eight millions and a half. Twenty years later they cost fifteen millions and a half, practically double. That gives you an idea what a revolution has taken place in the question of road maintenance in the course of twenty years in this country. And it is not merely because of pleasure motors. There are heavy motors for the conveying of passengers and goods. The road has become once more, not for mere transit of passengers, but for the conveyance of goods as well, and it is becoming more so. After all, I do not know that is a matter to be deplored. The more you improve communications the less you spend on distribution, and the less you spend on distribution the more is left for production, and that is a very important consideration for any country. Bad roads mean that a horse is taken away from the plow and attached to a cart. From the point of view of wealth making, that in itself is a bad thing. You have a great problem to consider, surface, dust, width, and I think especially, exits from great towns.

I am very glad to see that the Road Board has made grants, during the last few years, since it was formed in 1910, for the purpose of improving the roads of this country to the extent of over three millions; and I am very glad, in spite of all temptations to the contrary, that that money has been spent, not on maintenance, but on improvement. If the money had been dissipated merely in maintenance you would never have effected the improvement that has been effected very largely owing to the inducement afforded by that colossal grant of £2,300,000 for improving the roads. I am very glad they have got a little balance at the bank, and I hope some part of that balance will be spent on improving the exits from the great cities. I am very glad to hear that an arrangement has been effected between the Road Board and the Middlesex County Council for a new exit out of London, very sadly needed. I believe it will cost something under half a million, the Road Board undertaking three-quarters, and the Middlesex County Council one-quarter. It will be an enormous convenience, not merely for those who have got motors, but for those who have business to transact. Even in the solving of a question like the housing problem a good deal depends upon taking people out of congested areas in towns to live in the more refreshing air of the country. The town will become the mart, the shop, the entertainment center, and the country will be the home, the dwelling place, the nursery and the resting place. These are the things which go to the very root of the condition of every civilized country. These are the problems you are considering during the next few days, and I am delighted that some of the ablest men, representing thirty-nine governments, are here. There is not a civilized community in the world that is not represented in this hall today. I cannot recall a conference which represented such a vast area of interest and population and influence as that which is assembled here today, and I cannot recall a conference which had to settle down to the practical consideration of more important problems, and on behalf of the British Government I bid you all welcome.

The next speaker was Sir Geo. S. Gibb, Chairman of the Road Board and President of the Congress, who spoke as follows:

Mr. Chairman, my Lords, Ladies and Gentlemen: I thank you for the great honor conferred on me by election as President of the Third International Road Congress, and I have now the privilege of addressing you in the dual capacity of President of the Congress and Chairman of the Local Organizing Council.

No congress ever entered upon its labors under happier auspices. We have been honored by the patronage of His Majesty the King and by the gracious invitation of His Majesty to visit Windsor Castle. We have received encouragement and support from His Majesty's Government, at whose invitation we are holding our meeting in London, and we know that the work on which we are engaged deeply concerns the future welfare of the people, not of one country only, but of all countries in the world.

My first duty as your President is to express on your behalf most sincere and grateful thanks to the Chancellor of the Exchequer for the cordial welcome which he, on behalf of the Government, has given to the members of the congress. The personal interest which he has taken in questions affecting roads is well known, and it is to him that we in this country owe the measure which was the first step taken by Parliament to secure the double aim of improvement of roads and relief to ratepayers. The presence of Mr. Lloyd George at our inaugural meeting is a matter of special gratification to members of the Congress and in your name I tender him our best thanks for his address, and for all that he has done for roads as well as for all that we hope he will do.

I wish also at the outset of our proceedings to tender our most cordial thanks to all who have cooperated in the arrangements for the congress work. The papers, reports and communications, which have been prepared by most eminent road experts, contain a vast amount of original thought and research. For all the labor devoted to the preparation of these papers, which constitute our main contribution to the cause of road improvement and our enduring record, I tender our best thanks to the writers. To the Executive of the Permanent Association in Paris, whose experience and guidance in the work of organization have been of incalculable value, a special acknowledgment from the Local Organizing Council is due, and I am glad to have the pleasure of tendering this acknowledgment personally to the President of the Association, M. de Preaudeau, whose fame as a road engineer is everywhere known and to the Secretary, M. Mahieu, who is the life and soul of every movement to which he devotes his abundant energy. The work of local organization has been very pleasant owing to the universal and ready support which has been given to it throughout the United Kingdom. The Organizing Council is fully representative of local authorities, professional and technical institutions, traders' associations and private associations of persons interested in roads, from all of whom valuable support has been received. The duties of the committees amongst whom the work has been divided have been performed with ungrudging devotion. The program of inspections, excursions and entertainments is before you, and you will realize that such a program could not have been arranged without most generous help from many willing helpers. To all who have helped in any capacity I tender our thanks, and especially to the Lord Mayor and Corporation of the City of London, the Institution of Civil Engineers, the Surveyors' Institution, the Institution of Mechanical Engineers and the Royal Automobile Club, to all of whom we are indebted for the provision of hospitality which will be greatly appreciated by the members of the Congress. Much hospitality has also been offered, a great deal more than we have been able to accept, by mayors of the cities and towns we propose to visit, and many others whom we will be able to thank individually later on, but I would like to include these prospective hosts in my general acknowledgment of the great kindness and assistance which we have received on every side in connection with the organization of the Congress meetings.

The execution of all the details of the organization has been in the charge of our able and experienced General Secretary and Deputy Secretary and it is a great personal pleasure to me to express to Mr. Rees Jeffreys and Mr. Montagu Harris and to the staff who have aided them my sense of the zeal and efficiency with which their work has been done and to tender them the thanks of the Congress.

One of the most remarkable features of the existing situation in regard to roads is the number and scope of the unsettled questions. The cause of this state of general unsettlement and uncertainty is the rapid development of motor vehicles which have, with startling suddenness, revolutionized the use of roads and completely altered the conditions on which existing systems of road administration and practices of road engineers were based. Outside large cities and towns, which have their own special problems, the road question is the motor question. Roads require to be adapted to motor traffic. The old roads can no longer satisfy the new needs.

Who is to bear the burden of the necessary expenditure on reconstructions and improvements and more costly maintenance and in what manner and in what proportion is it to be spread over the various interests concerned? It seems to me that this financial question, with which the question of administration is closely connected, is one of first importance and I trust that the deliberations of the Congress will result in material of great value being provided towards the solution of the problem of placing on a practical and equitable basis the relations between finance and road improvement.

I will not attempt in speaking to you this afternoon to refer in detail to questions which will occupy us at the sectional meetings. The requirements of roads are so numerous and diverse as to baffle condensation, and it is no part of my duty as President, even if time were available for the purpose, to attempt to suggest to you the conclusions at which you will arrive.

In the engineering sections you will pursue your search for the ideal road adapted to each different set of conditions. It is waste of money to maintain a road either above or below the standard required for its traffic.

In the sections concerned with administration and finance you will have before you most valuable papers describing in full detail the systems in vogue in many countries. And you will find, as we should expect, great differences of opinion as to the respective advantages and disadvantages of centralization and devolution, and of state administration as compared with local administration. The general trend of opinion is undoubtedly in the direction of state management of all important roads in which there may be said to be a predominantly national interest. We have no experience of state-managed roads in this country, and although there is a widely held opinion that the state should make larger grants in aid of the maintenance of a considerable mileage of roads of national importance, with the necessary result of introducing more state control or supervision in regard to the maintenance of these roads, I do not see any considerable movement of British opinion towards the direct administration of any roads by a central department of state.

The area of highway administration has been constantly enlarged until it has grown, as regards main roads, from the parish to the county, and no doubt the county jurisdiction, which has in many counties proved most efficient and excellent, will be extended to cover a still greater mileage of roads within each county. Small areas, too small to provide adequate finance or sufficient skilled engineering supervision may tend to disappear and to be absorbed in larger areas. But highway administration will, I think, in Great Britain remain what it has always been, a function of local government. We will not readily part with the great advantages of local responsibility, local knowledge and local interest.

But even in this country, local administration would be in peril if highway authorities did not recognize, as I believe most of them do recognize, that modern road work must be in charge of thoroughly trained, competent, skilful and adequately paid engineers with adequate technical and accounting staffs. On this point I have no doubt the Congress will speak with no uncertain voice.

Great improvements in road making have been achieved since the Brussels Congress. Dust has been conquered. It does not exist to any appreciable extent on roads which have been properly treated with tar or bitumen. In Great Britain the general trend of engineering opinion is undoubtedly in favor of the use of tarry or bituminous substances in road making, and in England, perhaps, to a greater extent than in any other country, macadam treated with tar or bitumen has, not only experimentally, but definitely and practically taken the place of water bound macadam for roads of any importance. I do not, of course, refer to city streets, carrying intense and heavy traffic, for which other forms of pavement are more suitable. The extension of the use of tar and bitumen in road making depends now on financing the initial extra cost more than on any uncertainty in engineering opinion. But the choice of method still depends, as it should do, on individual selection in view of the actual requirements and conditions of the road. We must patiently try every promising method and material for many years before attempting to arrive at definite or final opinions.

You will see and judge for yourselves on the inspection tours, what has been done in the way of improvement on the roads you will visit and you will hear about other improvements. I hope and believe that your judgment will be that there is now a very large and a rapidly increasing mileage of good roads in this country. Anyone who studies what has been done within a very short period of time will, I think, be impressed with the practical manner in which the difficulties have been faced and will give great credit to the members and technical officers of our highway authorities who have, not universally, but in numerous cases, dealt with the situation in a business-like manner and promptly adopted the improved methods and materials which engineering science indicated as the most likely to yield good results.

I think it is also right to mention the indebtedness of the public to the voluntary societies who have interested themselves in the improvement of roads and who are well represented at this Congress. The situation was quite a delicate one. Too much activity or misdirected activity on the part of these societies, especially those directly representing the interests of motorists, might have hindered the object they had in view, but so sensible and useful have been the activities and operations of our voluntary helpers under the generally sagacious leadership of the Royal Automobile Club, and other leading automobile associations, and practical suggestions of the Roads Improvement Association and other similar societies that highway officials, generally acknowledge, as far as my experience goes, the advantages that have been gained from the assistance and the efforts of the voluntary associations.

I believe that the same may be said of many voluntary associations in other countries such as the automobile associations in the United States of America and the touring clubs in France and Belgium and no doubt of many others with whose operations I am not personally acquainted.

Our efforts to improve are being continued with accelerated pace. You will see at the exhibition abundant evidence of what private manufacturers are doing. The enterprise of these manufacturers aided by their professional advisers has initiated and developed improved methods and materials which in conjunction with the work of many able engineers in official charge of public roads, have contributed to the great advance in the art and science of road making which has taken place within the last few years.

Gentlemen, I will conclude by expressing on behalf of the Local Organizing Committee a hearty welcome to all the delegates and members both those from our own country and those who have come from over the seas, our fellow-workers for the improvement of roads, and also to the ladies, who have graced the Congress with their presence.

Others who spoke at this meeting were: Albert de Preaudeau, Inspector General of Roads and Bridges of France, and President of the Permanent Council of the International Commission of Road Congresses; Andrew Chargueraud, Inspector General of Roads and Bridges and Director of Roads and of Navigation to the Ministry of Public Works of France; Paul Etier, Chief of the Department of Public Works of the Canton of Vaud, Switzerland; J. von Forster, Engineer-in-Chief in the Ministry of Commerce, Budapest, Hungary; Hugo Franz, Chief of Bureau in the Imperial and Royal Austrian Ministry of Public Works, Austria; H. Genard, Inspector General of Roads and Bridges, Brussels, Belgium; Dr. Ernest Guglielminetti, General Secretary of the Anti-Dust League, Monte Carlo, Monaco; Col. Wm. de H. Washington, of the Consulting Board of Engineers of the New York State Highway Department, the United States; Dr. T. Lewald, Director of the Ministry of the Interior, Germany; Luigi Luiggi, Chief Inspector of the Corps of Engineers, Italy; Elie Radu, General Inspector and Director of Roads and Bridges, Roumania; Rufo Garcia Rendueles, Inspector General of Roads, Canals and Ports, Assistant Director of Public Works, Spain; J. Skougaard, Director General of Roads and Bridges, Christiana, Norway; A. N. Stolpakow, Privy Councillor and member of the Council of the Ministry of Ways and Communications, Russia; Wand, Government Councillor and Surveyor of Buildings and Constructions in the Ministry of the Interior, Bavaria; J. N. Welcker, Chief Inspector General of the "Rijkswaterstaat" at Oosterbeek, The Netherlands.

The exhibition at the Royal Horticultural Hall was opened in the afternoon by the Right Hon. Earl Beauchamp, K. C. M. G., President of the Exhibition Committee of the Congress. In his address, Lord Beauchamp called attention to the importance of the work of road engineers in past years and to its even greater importance today. Many, he said, who had not taken an especial interest in the question would be astonished when they found how large a capital and how intricate a plant was necessary for road improvement. He congratulated those who had had charge of the arrangements for the exhibition, and on behalf of the government wished it success.

After Lord Beauchamp's address of welcome, a letter from the secretary of President Poincare of France was read, in which the President's regret at his inability to attend the exhibition was expressed. The letter stated that since the President was the guest of the King and of the British Government during his stay in London he was unable to accept any invitations except those received through those sources, but that he desired to express his great interest in the work and his sincere wishes for the success of the exhibition.

The last event of the day was a conversazione held at the Guildhall in the evening, at which about 2,400 were present. The conversazione was tendered by the Corporation of London. The guests were received by the Lord Mayor and Lady Mayoress. The Royal Artillery Band played in the gallery of the Great Hall, and a concert by the students of the Guildhall School of Music was given in the Council Chamber. In the Art Gallery many of the especially interesting records of the city were on exhibition, as was also a special selection of books on matters pertaining to roads. The entertainment also included selestions played by the boy pipers of the Royal Caledonian Asylum, and dancing.

Tuesday, June 24

At 10 a. m., Section 1, Sub-Sections A and B combined, met at the Main Hall, Caxton Hall, for the consideration of Question 1, "Planning of New Streets and Roads." Capt. G. S. C. Swinton, Chairman of the Committee for the Town Planning of Delhi, presided, and S. D. Adshead, Professor of Civic Design at the University of Liverpool, acted as general reporter. Ten papers were presented by the following authors: Messrs. Schmidt, Nessenius and Greuling (joint paper), Germany; Masik, Austria; Verstraete, de Vaere and Evrard (joint paper), Belgium; Nohr, Denmark; Lewis, United States; Stoclet, France; Adams, Riley, Lancashire and Stilgoe (joint paper), Great Britain; Mihalyfi, Hungary; Cinque, Italy, and Doubelir, Russia.

In his report, Professor Adshead presented first a brief review of the papers, taking up each phase of the subject in turn. This was followed by concise abstracts of the several papers and by a set of resolutions. The resolutions were six in number and, after discussion, were adopted by the section with only minor changes. Those taking part in the discussion were Messrs. Bradaczek, of Austria; Loppens, of Belgium; Doerr and Stoclet, of France; Cassinone, Schmidt and Steuernagel, of Germany; Adams, Brodie, Emden, Lancashire, Smith and Stilgoe, of Great Britain; Cowan of Ireland; Radu, of Roumania; Corthell and Lewis, of the United States, and Prince Cassano, of Italy. Amendments were submitted by Messrs. Adams, Bradaczek, Doerr, Smith and Steuernagel, and Prince de Cassano. Conclusions were then adopted.

These concusions and those of other sections, as modified at the general meeting, are given later.

Section 2, Sub-Sections C and D combined, met at the Institution of Mechanical Engineers, also at 10 a. m., for the consideration of Question 5, "Methods of Lighting Public Highways and Vehicles." S. F. Edge, President of the Society of Motor Manufacturers and Traders, occupied the chair, while Col. H. C. L. Holden, C. B., F. R. S., acted as general reporter. Seven papers were presented on this subject by the following: Messrs. Fleck, Germany; Stransky, Austria; Hansez, Belgium; Sharp, United States; Tur and Chaix (joint paper), France; Brodie and Watson (joint paper), Great Britain; Merczyng, Russia.

The report of Col. Holden consisted of very brief summaries of the reports from each of the seven countries represented, brief notes by the general reporter and a set of resolutions. These were discussed by Messrs. Chaix, Mahieu, de Pulligny and Turcat of France, and Buchan-Hepburn, Gibb, Holden, MacDonald, Plummer and Ryves of Great Britain. After the discussion the conclusions for presentation to the general meeting were adopted.

At 2:30 p. m., Section 1, Sub-Sections A and B combined, met at the Institution of Mechanical Engineers to discuss Question 2, "Types of Surfacing to be Adopted on Bridges, Viaducts, etc." Sir Maurice Fitzmaurice, C. M. G., and later F. H. Berryman, of the County Councils' Association, presided. P. C. Cowan, B. Sc., M. Inst. C. E., President of the Civil Engineers' Institution of Ireland, acted as the general reporter. Seven papers were presented on this question by the following authors: Messrs. Heidecker, Austria; Denil and Bijls (joint paper), Belgium; Drowne, United States; Verriere, France; Humphreys and Taylor (joint paper), Great Britain; Nagy, Hungary, and Tanenbaum, Russia.

The report submitted by Mr. Cowan consisted of reviews of the seven papers presented, notes of his own on various bridges, and eleven conclusions.

The report was discussed by Messrs. Verriere, of France; Henning, of Germany; Hall, Smith and Wakelam, of Great Britain; Nagy, of Hungary; Turkert, of New Zealand; Radu, of Roumania, and Tanenbaum, of Russia. Amendments were offered by Messrs. Hall, Henning, Nagy, Radu, Smith, Tanenbaum and Wakelam.

Section 2, Sub-Section C, also met at the Institution of Mechanical Engineers at 2:30 p. m., the subject considered being Question 6, "Observations Noted Since 1908 as to the Various Causes of Wear and Deterioration of Roadways." H. P. Boulnois, M. Inst. C. E., occupied the chair, and Wm. Gibson Thompson, Editor of "The Surveyor and Municipal and County Engineer," acted as general reporter. Six reports were presented by the following authors: Franze and Pietzsche (joint paper), Germany; Duhm, Austria; Connell and Hewes (joint paper), United States; Lumet, France; Dryland, Crompton, Beaumont, Pickering, Sheldon, Maybury, Drummond and Wood (joint paper), Great Britain; Van Elzelingen, The Netherlands.

The report presented by the general reporter consisted of brief resumes of the various reports submitted, together with notes by the general reporter and a set of conclusions. These were adopted, with slight amendments, after their discussion by the following: Messrs. Lumet, of France; Timme, of Germany; Collins, Cooper, Crompton, Drummond, MacDonald, Osbourne, Powell, Sinnot and Ware, of Great Britain, and Teppert, Lord Montague of Beaulieu, Great Britain, and Prince Cassano, of Italy.

Section 2, Sub-Section D, met at the Surveyor's Institution, also at 2:30 p. m., to discuss Question 8, "Authorities in Charge of the Construction and Maintenance of Roads; Functions of Central Authorities and Local Authorities."

In the absence of the Hon. Arthur Stanley, M. V. O., M. P., who was to occupy the chair during the discussion of this question, Robert Todd, Chairman of the Roads Improvement Association, presided over the discussion. The general reporter was W. Rees Jeffreys, Secretary of the Road Board and General Secretary of the Third International Road Congress. The reports on this question were ten in number and were presented by the following: Cassinone, Germany; Dubosch, Belgium; Guechoff, Bulgaria; McLean, Canada; Sargent and Travilla (joint paper), United States; Marion, France; Copnall, Ferguson, Hepburn, Lord Strachie, Williams, Hodgkin, Heslop and Jarratt (joint paper), Great Britain; Forster, Hungary; Rimondini, Italy; Stolpakow, Russia.

The report presented by the general reporter, W. Rees Jeffreys, consisted of an analysis of the problem in the light of the several reports, a set of conclusions and eight appendices. The first appendix consisted of a summary of the systems of highways in operation in various countries under consideration; the second appendix consisted of a summary of the organization of the engineering staffs engaged in road maintenance in Belgium, Bulgaria, France, Germany, Hungary, Italy, the United Kingdom, the United States and Russia; Appendix 3 consisted of synopses of various highway laws passed recently by governments in Canada and Australia; Appendix 4 consisted of a table showing the methods of carrying on road maintenance in rural districts in England and Wales; Appendix 5 consisted of a table showing the details of the road authorities and the classification of roads in various countries in Europe, America, Asia, Australia and Africa; Appendix 6 comprised a table showing lengths of roads, classified according to their character, the total annual expenditure upon construction and maintenance and the source from which such expenditures were derived in a large number of countries; Appendix 7 consisted of a table showing the number of motor vehicles, classified according to their character, in a number of countries, and Appendix 8 consisted of a table showing the mileage of roads, the number and kinds of highway authorities and expenditures for 1911 in each of the several states of the United States.

The discussion was participated in by the following: Messrs. Heude, of France; Cassinone, of Germany; Becher, Copnall, Emden, Harris, Mitchell and Lascelles-Southwell, of Great Britain, and Kenyon, of the United States; and Sir George S. Gibb and Lord Strachie of Great Britain.

From 3:30 to 7 p. m., Lady Gibb, wife of Sir George S. Gibb, President of the Congress and Chairman of the Road Board, was "at home" to members and associates of the Congress. A large number of the delegates availed themselves of Lady Gibb's hospitality.

One of the five additional excursions previously mentioned, No. 20, was made on this day. It was a steamer trip on the Thames to the London County Council northern sewage outfall works at Barking and the electric power generating station for tramways at Greenwich.

Wednesday, June 25

Section 1, Sub-Section A, met at the Main Hall, Caxton Hall, at 10 a. m., for the discussion of Question 3, "Construction of Macadamized Roads Bound with Tarry, Bituminous or Asphaltic Materials." The meeting adjourned at 12:45 p. m. until 2:30 p. m., at which time it resumed the discussion.

The Right Hon. Sir J. H. A. MacDonald, K. C. B., occupied the chair, and J. Walker Smith, M. Inst. C. E., was general reporter. Twelve reports were presented on the question by the following authors: Sperber, Wernecke and Vilbig (joint paper), Germany; Bradaczek, Austria; Macquet and Brondeel (joint paper), Belgium; Lloyd-Davies, Egypt; Blanchard, Crosby and Hubbard (joint paper), United States; Wender, Mayer, Le Gavrian and Frontard (joint paper), France; Thomas, Butterfield, Hooley, Crompton, Greatorex, Smith, Morris, Manning and Gladwell (joint paper), Great Britain; Callias, Greece; Rauch, Hungary; Torri, Italy; Toukholka, Russia; Grivaz and An der Auer, Switzerland.

J. Walker Smith, the general reporter, presented the subject in a summary of the reports in which the question was taken up under sixteen sub-heads. Under each of these, he presented briefly the essential points made in the several reports and then set forth for consideration certain conclusions. The report closed with a number of general conclusions and others referring to particular phases of the subject. The report was discussed by the following: Messrs. Crane, of Australia; Franz, of Austria; Loppens, of Belgium; Doerr, of France; Steuernagel, of Germany; Collins, Crompton and Hooley, of Great Britain; Callias, of Greece; Kent of India; Lo Gatto, of Italy; Radu, of Roumania; de Timonoff, of Russia, and Blanchard, Crosby, Church, Sohier and Washington, of the United States. Amendments were proposed by Messrs. Callias, Doerr, Blanchard, Crosby, Franz, Loppens, Steuernagel and de Timonoff. The amendments were then discussed and conclusions adopted.

Section 1, Sub-Section B, met at the Surveyor's Institution at 10 a. m. for the discussion of Question 4, "Wood Paving." Sir Maurice Fitzmaurice, C. M. G., presided, and H. Percy Boulnois, M. Inst. C. E., acted as general reporter. Nine reports were presented on this subject by the following authors: Krause and Horburger (joint paper), Germany; Dassen, The Argentine; Mountain, Australia; Kosetschek, Austria; Tillson, United States; Mazerolle, France; Brown, Mawbey, Blair and Winter (joint paper), Great Britain; Lappert, Hungary; Vroublesky, Russia.

The report submitted by the general reporter consisted of brief resumes of the several reports submitted, a short summary of those reports and a set of resolutions.

The discussion which followed the presentation of the report was taken part in by Messrs. Tur and Bienvenue, of France; Krause, of Germany; Blair, Harrison, Hayward, Julian, Mawbey, Scorgie, Winter and Wyatt, of Great Britain, and Tillson, of the United States. Amendments were submitted by Messrs. Julian, Krause and Winter and by members of the French delegation, after which conclusions were adopted.

Section 2, Sub-Section C, met at the Institution of Mechanical Engineers at 10 a. m., for the consideration of Question 7, "Regulations for Fast and Slow Traffic on Roads." W. Joynson-Hicks, M. P., Chairman of the Automobile Association and Motor Union, occupied the chair and Lord Montagu of Beaulieu acted as general reporter. The six reports submitted on this question were by the following: Bredtschneider and Kunitz (joint paper), Germany; Bradaczek and Schmal-Filius (joint paper), Austria; Eno, United States; Chaix, France; Hellard, Carpenter, Middleton, Thomson and Woolen (joint paper), Great Britain; Sandberg, The Netherlands.

The general reporter's report consisted of brief abstracts of the reports from the several countries represented, together with a set of resolutions. These were discussed by Messrs. Bradaczek, of Austria; Colard and Hansez, of Belgium; Chaix, Franchomme and Turcat, of France; Rampold and Reiss, of Germany; Lancashire, of Great Britain, and Van Heyst, of Holland; and the Duke of Ursel, of Belgium; Dr. Tull and Count von Rosen, of Germany; Lord Montagu and Capt. Deasy, of Great Britain, and Prince de Cassano, of Italy. The meeting then adopted as conclusions seven of the eight resolutions presented by the general reporter and an additional conclusion proposed by Mr. Chaix of France.

Section 2, Sub-Section D, met at the Lounge Hall, Caxton Hall, at 10 a. m., to discuss Question 9, "Finance of the Construction and Upkeep of Roads; Provision of Revenues." The Right Hon. C. E. Hobhouse, M. P., Chancellor of the Duchy of Lancaster, and later Robert Todd, Chairman of the Roads Improvement Association, occupied the chair. The general reporter was G. Montagu Harris, M. A., Secretary of the County Councils' Association of England and Wales. Nine reports were submitted on this question by the following: Timme and Pietri, Germany; Dassen, The Argentine; Geuchoff, Bulgaria; Richardson, United States; Bordas, France; Berryman, Maybury and Jeffreys (joint paper), with appendices by Clare, Berryman, Haward and Jarratt, Great Britain; Nemethy and Keviczky (joint paper), Hungary; Frosali, Italy; Meyen, Russia.

In presenting the subject to the meeting, the general reporter, G. Montagu Harris, divided roads into five classes and reviewed briefly the methods of financing applicable to these different kinds of roads in France, Germany, Italy, Hungary, Bulgaria and England and Wales. The latter part of his report consisted of a review of the several reports submitted, arranged under the heads "Financial Responsibility for Roads," "Sources of Revenue" and "Loans." These were followed by conclusions submitted to the meeting. The discussion on the question was participated in by Messrs. Heude of France; Timme and Von Haag, of Germany; Bund, Copnall, Emden, Keith, Plummer and Williams, of Great Britain, and Cowan, of Ireland, and Lord Belper, of Great Britain. Amendments were offered by Messrs. Bund, Emden and Plummer. After the discussion of the amendments, conclusions were adopted for presentation to the final meeting.

During the day a number of the delegates inspected the London County Council fire brigade headquarters. This inspection was scheduled as Excursion No. 21, which was one of the additional excursions arranged for shortly before the opening of the Congress.

At 9 p. m., a reception was tendered to the delegates by the Institution of Civil Engineers at Albert Hall. The meeting was also the annual conversazione of the organization, and about 3,000 were present.

Thursday, June 26

No sectional meetings were held on Thursday, the day being given up to four of the eight excursions scheduled for congress week. The excursions for Thursday were those designated as Nos. 4, 5, 6 and 7, none of which required more than a day.

Excursion No. 4 was made by motor cars, starting from London and passing through Romford, Chelmsford and Epping Forest. At Chelmsford the delegates had lunch and were received by the Mayor.

Excursion No. 5 was a visit to Windsor Castle, with tea in the grounds, at the invitation of the King. Over 1,100 delegates made the trip, which was by train.

Excursion No. 6—the river trip—was made by train and launch, the party going from London to Windsor by train, from Windsor to Marlow by launch and then back by train to London. Lunch and tea were had on the launch.

Excursion No. 7—the Berkshire trip—was made by train and motor char-a-bancs, the trip from London to Maidenhead being made by train and from there to Windsor, Ascot and Reading by char-a-bancs. About 120 made the trip.

In the evening the members of the congress were tendered a reception at the Royal Automobile Club by the Chairman, Hon. Arthur Stanley, M. V. O., M. P., and the committee of the club.

Friday, June 27

At 10 a. m., Friday morning, the Permanent International Council held a meeting, at which President Preaudeau of the Executive Committee occupied the chair. The resolutions adopted at the sectional meetings were read and discussed, Messrs. Boulnois, Franz, Gibb, Lewald, Mahieu, Preaudeau, Radu, de Timonoff, Tincauzer and Welcker taking part in the discussion. Amendments to be submitted to the final meeting were then drawn up. Arrangements were also made for speakers at the final meeting, and it was arranged that at the banquet to be held on Saturday night at the Hotel Cecil Dr. Lewald should speak on behalf of the German speaking members, Mr. Luiggi on behalf of the members from Latin countries and Mr. Stolpakow on behalf of members from Slavic countries.

At 2:30 p. m. the final meeting of the congress was held at Caxton Hall, Sir George S. Gibb, General President of the Congress, occupying the chair. The resolutions on the nine questions as adopted at the sectional meetings were read in the three official languages of the congress, amendments proposed and, after discussion, voted upon. The discussion on the amendments was participated in by Bradaczek and Franz, Austria; Macquet and Muhlen, Belgium; Mahieu, France; Lewald, Germany; Boulnois, Buchan-Hepburn, Haughton, Lucy, MacDonald, Oswald, Plummer, Todd and Williams, Great Britain; Luiggi, Italy; de Timonoff and Tanenbaum, Russia, and Crosby, the United States.

President Gibb thanked those who had cooperated in the holding of the congress, and Dr. T. Lewald, one of the German delegates, invited the congress to hold its next meeting at Munich in 1916. Addresses were made on behalf of their respective countries by the following delegates: Messrs. Franz of Austria, Rendules of Spain, Preaudeau of France, Luiggi of Italy; Skougaard of Norway, Stolpakow of Russia, Helleberg of Sweden, Nakahara of Japan, and Welcker of The Netherlands. Albert Mahieu, General Secretary of the Executive Committee of the Permanent International Association of Road Congresses, also addressed the meeting, thanking the general reporters, presidents, secretaries and assistant secretaries of the sections for their work.

The text of the resolutions as finally adopted follows:

RESOLUTIONS

1st Question—Planning of New Streets and Roads

1. As a general principle, it is better that new main roads be constructed to pass outside rather than through towns, and where an existing main road passing through a town is unsatisfactory for through traffic, it is often better to construct a new by-pass route in preference to widening an existing narrow main road through the center of a town. New roads should be planned according to the principles of the science of town planning.

2. Gradients on new roads should be as easy as possible having regard to the physical character of the country through which they pass and they should be easier where there are curves, trams, or a preponderance of heavy traffic.

3. The radii of curves in roads used by fast traffic should, where practicable, provide the best possible and an unobstructed view, and where this is not possible—the curve being of too short a radius—means should be provided whereby the approach thereto is in some way clearly indicated.

4. Except where it is possible to provide special reserved spaces, tram tracks are best placed in the center of the roads, and where so placed it is desirable to provide space on either side for two tracks for vehicles.

5. The main traffic roads should be so designed that spaces are provided for tram tracks, fast and slow traffic, and standing vehicles; and in such a way that they can proceed without unduly intermixing. In fixing building lines along what may ultimately become main roads, regard should be paid to ultimate requirements. Adequate space should be provided between the buildings, and powers for enforcing this should be held by all authorities who decide the widths of roads.

6. The planning of main road communication outside towns should be at once undertaken; it is a matter of national importance in regard to which some initiative should rest with a central state authority, and the action of local authorities should to some extent be regulated or supervised by central state authorities.

2d Question—Types of Surfacing to Be Adopted on Bridges, Viaducts, Etc.

1. The choice of road surfacing for bridges depends on the nature and intensity of the traffic, the local conditions, such as permissible first cost, kinds of material readily available and climate. For light bridges the choice is largely influenced by the weight of the surfacing. Public safety and convenience should be first regarded rather than questions of comparative cost.

2. On short bridges in town or country, it is desirable that the surfacing should be the same as that on the adjoining streets or roads.

3. In forming the roadway on bridges, special care should be taken to secure proper drainage, and to prevent the harmful percolation of water. With longitudinal gradients of at least 1 in 50, the cross section of the surface may be made nearly flat and the dead load thus reduced.

VIEW DOWN THE CENTER AISLE OF THE ROAD EXHIBITION IN THE ROYAL HORTICULTURAL HALL, LONDON, ENGLAND—THIRD INTERNATIONAL ROAD CONGRESS.

4. As a general rule, the surfacing of a bridge should be waterproof, capable of resistance to wear, durable, and of a weight appropriate to the structure of the bridge; it should also be as smooth as possible without being slippery.

5. Plank surfacing on bridges is light, and its first cost is low. Its cost of maintenance is, however, excessive, except where the traffic is light. Its extreme liability to damage by fire is a serious disadvantage. It should not be adopted, except in remote districts in which there is an abundance of cheap timber, and where a more desirable form of surfacing is not easily obtainable. Single plank floors are only suitable for very light traffic. For moderate or heavy traffic, two layers of planking, the lower of which is creosoted or otherwise protected from rapid decay, should be used.

6. Macadam, or ordinary broken stone surfacing, on timber planking, is not always satisfactory on account of its great weight and its permeability. Macadam is, however, quite satisfactory for massive bridges in rural districts, if the substructure has a proper damp course.

7. Macadam, bound with tar, or other waterproof and elastic material, is useful and economical for the surfacing of rural bridges with moderate traffic, when the spans are short or the structure is massive.

8. Wood block paving, 3 to 5 ins. thick, is an ideal surfacing for bridges in most cases. It is light and durable and can be laid on concrete, or, when weight must be minimized, on a timber sub-floor, which should be creosoted. Special care should be taken in the selection, treatment and laying of wood blocks for bridge paving, to avoid troubles due to expansion and contraction of the blocks or of the metal structure.

9. Asphalt, in various forms, is an excellent surfacing material for bridges with easy gradients, on which the traffic is not confined to definite lines or very heavy.

10. Stone paving, carried out either with ordinary hand dressed setts or with small setts (Durax or Kleinpflaster), laid on concrete and bound with cement or pitch, makes an excellent and economical surfacing for bridges with heavy traffic. However, it is only suitable in cases where questions of the weight of the surfacing or of noise are of no importance. The thickness of the layer of sand interposed between the setts and the foundation will be decided in the same way as with an ordinary carriageway, in town or country, as the case may be.

11. For movable bridges, and for non-rigid suspension bridges, the surfacing should be light and easy to attach to the bridge platform. The trials made in France and Belgium with old mine cables, or other fibrous substances of even less cost, and with such materials impregnated with tarry, bituminous or asphaltic materials should be encouraged.

3d Question—Construction of Macadamized Roads Bound With Tarry, Bituminous, or Asphaltic Materials

GENERAL CONCLUSIONS

By the use of bituminous, including tarry or asphaltic binders, we may obtain a number of different forms of road crust, which may be employed with advantage, according to the various conditions of the road as regards traffic, locality and climate.

The exact value and duration of life of these various road crusts, taking into account traffic, climatic conditions, and the methods of construction, remain to be determined.

For this purpose it is advisable to draw up a uniform system of tests, measurements and records, under the following headings:

1. Physical and local conditions. (Plans, cross section, slopes, camber foundations, subsoil.)
2. Materials employed; petrological analysis; dimensions; composition of the binding agent.
2a. Method of construction; date of construction.
3. Census of traffic on the section under review.
4. Climatic conditions affecting the road.
5. Periodical measurement of wear.
6. Periodical examination of the state of the road crust.
7. Actual cost of the road crust—(a) as regards cost of construction; (b) as regards maintenance cost.

The standard form in which the information is to be furnished will be drawn up by the Permanent Commission.

PARTICULAR CONCLUSIONS

I. Foundation and drainage.

Confirming the conclusions adopted in 1910 by the Second Congress (Brussels, Question 2), which called attention to the advantages of a dry foundation and a sound sub-soil, the Congress especially insists upon the great importance of efficient foundations in the case of road crusts bound with bituminous (including tarry or asphaltic) binders for the following reasons:

(1) The road crust being expensive, it is important to give it a base which will increase its life.

(2) As the weight, speed and intensity of the traffic continually tend to increase on roads considered worthy of such a crust, it is best to provide a foundation which has been so constructed as to secure for the crust the best possible conditions of resistance to wear.

II. Dimensions and shape of metaling.

(1) When an ordinary macadamized road crust is constructed with a view to being tar-sprayed, it should be constructed of hard metal, with sharp edges, and broken as nearly as possible to a cube of the dimensions of from 4 to 6 cm.

(2) In the case of bituminous, including tarry or asphaltic, macadam, carried out by the mixing process, the dimensions of the metal may be so selected and graded as to form a compact road crust with the fewest possible voids. The dimensions of the largest metal may vary according to the nature of the stone and of the traffic. When the process of construction employed requires more than one layer of material, the upper layer or wearing crust may be formed of smaller metal.

(3) In respect of bituminous, including tarry or asphaltic, road crusts constructed by the penetration process, the trials and tests now being carried out in various countries should be continued, taking care only to employ metal of as cubical a shape as possible, and with sharp edges, at any rate for the portion of the road crust nearest the surface.

(4) It is understood that further experiments will also be carried out in the use of other methods, and especially those referred to in paragraphs (1) and (2).

III. Employment of partially used metal.

By carefully eliminating all particles of mud and organic matter, it is possible to successfully make use of partially worn materials, on condition that they are not employed for the surface of the road crust.

IV. Relative importance of patching.

It is agreed that it is absolutely necessary to carry out repairs, in the case of all bituminous, including tarry and asphaltic, road crusts, immediately the necessity for them arises.

VIEW OF A PORTION OF THE ROAD EXHIBITION IN THE GROUNDS OUTSIDE THE ROYAL HORTICULTURAL HALL, LONDON—THIRD INTERNATIONAL ROAD CONGRESS.

V. Permissible wear.

The complete renewal rendered necessary by wear must be carried out immediately the depth of the road crust is below a given limit of safety, or when its waterproofing qualities have become so poor that the road will unduly suffer from climatic conditions.

VI. Various means of employing tarry, bituminous and asphaltic materials.

In using these materials, both in the penetration method and the mixing method:

(a) It is preferable to use dry stone in order that it may adhere well to the binder. In the mixing method the stone must always be dry, and if necessary it must be heated.

(b) One must never lay a top crust upon a soft or damp foundation. One should preferably carry out the work in fine weather.

(c) One must never employ too much binder, but only a sufficient quantity to bind the portion of the road which is being rolled.

(d) One must never employ road rollers which are too heavy.

VII. Tests and chemical analyses.

The advantages of analyses and methodical laboratory tests, and their necessity in the case of bituminous binders, are unanimously recognized.

It would be of advantage to obtain uniformity:

(1) As regards the specification of the principal characteristics of these binders.

(2) As regards the methods of testing for drawing up these specifications. The Permanent International Commission will be intrusted with the work of inquiring into the best way of standardizing the above.

VIII. Climatic effects.

It appears to be generally agreed that certain tarry, bituminous or asphaltic road crusts (as is also usually the case with all smooth and waterproof road surfaces) may become slippery under certain conditions of weather. This may be remedied by strewing the surface with coarse sharp sand; and in most cases a good cleansing of the surface will usually prevent the carriageway becoming slippery.

IX. Effects on public health, etc.

Sufficient information is now available to enable engineers to select and specify bituminous binders which will have no prejudicial effect upon public health, fish life, or vegetation; but which, on the contrary, will conduce to conditions of considerable hygienic advantage.

X. Cleansing and watering.

It is recognized that carriageways properly treated with bituminous, including tarry or asphaltic, materials require less sweeping and watering than ordinary water bound macadamized roads, and that they allow of considerable economy being effected under this head.

The meeting puts forward the following additional proposal: That an international technical committee should be appointed by the Permanent International Commission in order to study a standard method of obtaining information and data upon materials, physical conditions, local conditions, methods of construction, terminology and other points concerning macadam bound with tarry, bituminous or asphaltic binders.

The report of the committee should, after examination by the Permanent Commission, be presented to a next congress.

4th Question—Wood Paving

1. Where gradients permit, wood block pavement is very suitable for streets where the traffic is great but is not of the exceptionally heavy character usually existing on streets near docks or similar centers of industrial traffic. It should be used where a noiseless pavement is desirable.

It is of great importance that a concrete foundation should be laid of sufficient strength to carry the traffic passing over the pavement.

2. Great care is necessary in the selection of the proper timber for the purpose, and all soft wood blocks should be thoroughly impregnated with a well proved preservative before being laid.

3. In view of the varying results given by wood pavements, according to local circumstances, it is desirable that further investigations and laboratory experiments should be carried out in connection with the selection of the timber and of the impregnating preservative.

4. Every precaution should be taken in laying the blocks to prevent, so far as possible, the entry of water through the joints.

4a. Hard woods give varying results according to local circumstances, and **it does not appear desirable to recommend them for roads with intense traffic in large cities,** unless some means are devised to effectively prevent the rapid destruction of the joints and the resulting destructive effect on the concrete below. If these woods are employed it is desirable not only to prevent the percolation of water through the joints to the foundation, but also to consolidate the blocks as far as possible, so that they may not become rounded at the edges.

Soft woods obtained from suitable kinds of trees, and especially from resinous species, are equally suitable for roads with a comparatively heavy and intense traffic as well as for roads with a light and infrequent traffic. In the latter, however, the blocks are liable to rot if they have not been suitably pickled. It is also desirable to make the joints as small and watertight as possible. On the other hand, their comparatively rapid wear on roads with great traffic should encourage one to make exhaustive investigations into the best means of treating them, so as to increase their strength without prejudice to their elasticity.

5. Subject to certain precautions, such as impregnating of the wood, waterproofing of the joints and surface, frequent cleaning of the roadway, etc., there is no objection to wood pavement from the sanitary point of view.

6. The spreading of gritting is necessary under certain conditions and in certain weather (especially on hard wood paving) to prevent the surface becoming slippery, but the gritting should be done with suitable small gravel chippings or sharp sand, so as to avoid, as far as possible, any injury to rubber tires.

5th Question—Methods of Lighting Public Highways and Vehicles

I. For the purposes of a general determination of methods of lighting, highways may conveniently be divided into three classes as follows:

(1) Important streets in cities, towns or other urban areas in which the traffic after dark is considerable in volume;

(2) Important suburban roads in the vicinity of large towns;

(3) Rural roads in open country;

and having regard to modern conditions of traffic it is essential that adequate lighting by means of fixed lights should be provided in classes 1 and 2.

II. As a general principle in the lighting of all highways which require to be lighted by means of fixed lights, the method of lighting to be adopted should be such as will provide an illumination as uniform and free from glare as possible. The amount of illumination and the position of lamps must be determined with reference to local circumstances.

III. It would be impracticable to light rural roads in open country generally by similar methods to those adopted in urban streets or suburban roads, and the lighting of vehicles running or standing on rural roads at night is therefore of the highest importance.

IV. (1) Every vehicle whether standing or moving should carry or show a light of sufficient power at night which can, except when specially authorized, be seen from the rear as well as from the front of the vehicle.

(2) Every motor car must carry after nightfall, two lighted lamps in front, and one at the back; if it is able to move at a high speed it must be fitted in front with a headlight of sufficient illuminating power to light up the road or path for at least 50 yards to the front. In inhabited places where the ordinary lighting is sufficient to allow motorists to see their way and to be easily seen, the light of the headlights must be limited to that of the ordinary lamp.

V. (1) It is desirable that all obstacles across a road, such as gates, and particularly gates at railway level crossings, should be painted white and in other colors in alternate parts, and illuminated by fixed lights which are lighted at dusk.

(2) It is desirable to paint white or indicate by some other method all danger signal posts, direction posts and other posts, milestones, wheel curbs, bridge abutments, etc., or other special features, the indication of which would aid travelers, or conduce to the safety and convenience of the traffic.

VI. One and the same color should be universally adopted as the color for danger signals.

The meeting, on the proposal of Mr. Chaix, unanimously adopted the following resolution:

"It is desirable that each Government should do away as soon as possible with colored lights on automobiles."

On the proposal of Mr. Hansez, the meeting adopted the following resolution, with two dissentients:

"The Congress expresses the wish that regulations should be made to compel drivers of herds of cattle to make their presence known at night."

6th Question—Observations Noted Since 1908 as to the Various Causes of Wear and of Deterioration of Roadways

1. Weather conditions are amongst the most powerful influences which cause deterioration of roads, and the destructive effect of weather can be minimized by effective waterproofing of the road surface, with suitable drainage for the foundation.

2. Any considerable volume of traffic consisting of either heavy motor vehicles or high speed light motor cars has a seriously damaging effect on water bound macadam roads. The damage caused is effected by the balancing of the motor; the ratio between propelling power and adhesive weight; the weight of unsprung portions of the motor; the progressivity of action of the brakes; the system of springing; the type of tires employed; the diameter of the wheels; the width of the rims; variation of speed and adherence, and other factors.

3. The damaging effect of heavy motor vehicles can be minimized by the use of wheels of large diameter; tires of a width properly adapted to the weight of the axle load; rubber or elastic tires and suitable springs; and all reason-

able means of reducing the damage to roads caused by such vehicles should be enforced.

4. Light motor car traffic does not cause serious or exceptional wear or damage in the case of properly made macadam roads which have been properly treated or bound with tarry, bituminous or asphaltic materials, except on sharp curves.

As regards horse-drawn vehicles it is desirable also to study the relations between load, width of rims and diameter of wheels and more especially the system of shoeing horses. It is also necessary that power should be given to local authorities to prevent the deposit of refuse from the fields and earth upon the roadway by the wheels of agricultural carts.

5. There is still a great lack of precise information in regard to the various causes of wear and deterioration of roadways and it is desirable to collect more information compiled on carefully devised scientific methods standardized as far as possible for the purposes of comparison, and to make further systematic study of these causes.

The International Permanent Commission is charged with the preparation of a program of observations, studies and experiments.

7th Question—Regulations for Fast and Slow Traffic on Roads

1. All regulations for the control of road traffic should be based on the principle of allowing the speed practicable for each different kind of vehicle consistent with public safety, general convenience, and the normal wear of the road.

2. Regulations for the conduct of fast and slow traffic should be as few and simple as possible and should be such as can and ought to be universally adhered to and enforced.

3. In all large cities there should be a traffic authority on whom should be charged the duty of studying and dealing with street traffic problems, the powers of such authority and the coordination of such powers with those of other public authorities being matters of detail which must be settled by public authorities on consideration of the circumstances and conditions of each large city.

4. There should be ample provision of traffic controllers (such as the police in London) with adequate powers to regulate the traffic, not only at congested points, but throughout the course of crowded streets.

5. Having regard to the increased danger which is necessarily created by the conditions of modern traffic, it is important that drivers should be carefully and systematically trained, and that children should be specially taught how to provide against the dangers of the road.

6. Except where local circumstances render it absolutely necessary, no obstructions, such as lamp posts, tramway standards, etc., should be placed in the center of a road, except necessary refuges for pedestrians crossing.

7. No obstruction of the public highway should be permitted either by vehicles standing unreasonably or traveling at an obstructing speed, or by things placed on the highway. Exception must, however, be made for depots required for the work of maintenance or repair of the road, or for work being carried out by duly authorized and competent authorities, but in every case, all necessary steps must be taken to insure the safety of traffic.

The meeting, on the propasal of Mr. Chaix, unanimously adopted the following resolution:

8. "Regulations for roads and traffic must aim at defining the rights, duties and responsibilities for each kind of traffic, in order to avoid the causes of accidents and damage and to insure the maximum of order and liberty."

8th Question—Authorities in Charge of the Construction and Maintenance of Roads—Functions of Central Authorities and Local Authorities

1. The system of road administration in any country must be in harmony with the general system of government prevailing in that country, and the political genius of its people. It is impossible, therefore, to lay down any general rule of universal application as to the extent to which the road organization of any country should be centralized or decentralized.

2. A principle that can be laid down as of universal application is, that the unit of highway administration shall be sufficiently large and command sufficient resources to employ and adequately remunerate a competent staff.

9th Question—Finance of the Construction and Upkeep of Roads—Provision of Revenues

1. The expenditure on the maintenance and improvement of

(a) the roads which serve as main routes of communication between important places in any country, or

(b) roads which are used mainly by long distance traffic, unless such expenditure is borne wholly out of the national revenues under a system of state administration of roads (which system is practicable and suitable in the case of some roads in some countries) should be mainly paid for out of national revenues, whether or not such roads are locally administered and maintained, subject, where local administration prevails, to the supervision of a central government authority both as to efficiency and expenditure.

2. It is desirable to abolish, so far as possible, all tolls on public roads, but it is equitable that vehicles which, on account of their weight or weight combined with speed or any other exceptional circumstances connected with either the vehicle or use of the road, cause special damage to roads beyond the wear and tear of the ordinary traffic of any district, should be subject to special taxation the proceeds of which should be earmarked for expenditure on roads.

3. Borrowing money for new road construction and for the periodic renewal of the surface coating of a road is consistent with sound financial principles provided that the loan period in the case of loans for renewals, is kept well within the life of the surface coating.

The meeting adjourned at 4:30 p. m.

Excursion No. 19, one of the five additional excursions previously referred to, was made by a number of the delegates during the day. The trip was made by tramcars, its principal feature being a visit to the Clero refuse crusher at Southwark. An opportunity was also had to inspect a machine for cutting down old wood paving block for further use, and a section of roadway paved with the renovated blocks.

In the late afternoon the delegates were entertained by the President, Council and members of the Surveyors' Institution at a garden party in the Royal Botanical Gardens at Regent's Park.

In the evening many of the delegates attended the theater, parties being made up to visit different London playhouses.

Communications

Besides the nine questions there were ten communications upon which reports were submitted but which were not discussed at the sectional meetings because of lack of time. A list of these communications, together with the authors of the reports on each, follows:

FIRST SECTION

CONSTRUCTION AND MAINTENANCE

Communications Common to Sub-Sections A and B

Communication 1.—Improvements Adopted Since the Second Congress in Machinery Used in the Construction and Maintenance of Macadamized Roads.

Reports as follows: Lucas, Hess, Speck, Neminar, Henning and Neidner (joint paper), Germany; Bradaczek, Austria; Dean, United States; Guillet, France; Dodd, Hadfield, Hawkins, Humphreys, Killick, Van Putten, Stallard and Yabbicom (joint paper), Great Britain; Rauch, Hungary; Steffelaar, Redele and Van Daalen (joint paper), The Netherlands.

Communication 2.—Tests of Materials Used in the Construction of Macadamized Roads.

Reports as follows: Hirschwald, Germany; Hanisch, Austria; Page, United States; Le Gavrian, France; Stanton and Batson (joint paper), Great Britain.

Sub-Section A

Communication 3.—Construction of Water Bound Macadamized Roads.

Reports as follows: Vytvar, Austria; Cornet, Belgium; Johnson, United States; Lelievre and Pons (joint paper), France; Stevenson, Heslop and Willmot (joint paper), Great Britain; Glasner, Hungary; Vandone, Italy; Toukholka, Russia.

Communication 4.—Technical and Economic Study of the Comparative Advantages of Different Types of Roads.

Reports as follows: Scheuermann and Pietzsch (joint paper), Germany; Rablin, United States; Sigault, France; Wakelam, Crompton, Dryland, Hayward and Wood (joint paper), Great Britain; Cattaneo, Italy; Guglielminetti, Monaco; Wentholt, The Netherlands; Kouperstein, Russia.

Sub-Section B

Communication 5.—Various Types of Stone Paving in Use.

Reports as follows: Voss, Germany; Sherrerd, United States; Labordere, France; Steele, Great Britain; Glasner, Hungary; Abramoff, Russia.

SECOND SECTION

TRAFFIC AND ADMINISTRATION

Sub-Section C

Communication 6.—Direction and Distance Sign Posts.

Reports as follows: Gaetjens and Schreitmuller (joint paper), Germany; Bradaczek, Austria; Evans and Batchelder (joint paper), United States; Lorieux, France; Davis, Baskerville, Cooke, Crawley, Lister, Noble and Riche (joint paper), Great Britain; Tortora, Italy.

Communication 7.—Development Since the Second Congress of Self-Propelled Public Service Vehicles.

Reports as follows: Horburger and Schwabe (joint paper), Germany; Hofer, Austria; Swetland, United States; Perisse, France; Shrapnell-Smith, Great Britain; Toller, Italy; Tsimmbalenko, Russia.

Sub-Section D

Communication 8.—Qualifications of Engineers and Surveyors in Charge of the Construction and Maintenance of Roads; Wages and Conditions of Service of Foremen and Roadmen.

Reports as follows: Knipping, Schweitzer and Cassinone (joint paper), Germany; Parker, United States; Tourtay, France; Boulnois, Cowan, Sheldon, Smith, Brookes, Challoner, Crosier, Dorman, Horton, Robb, Schofield and Wood (joint paper), Great Britain; Nemethy, Hungary.

Communication 9.—Statistics of Cost of Construction and Maintenance.

Reports as follows: Vespermann, Gaetjens and Range (joint paper), Germany; Breitenfelder, Austria; Masson, France; Ryves, Gowen, Harding, Moncur, Nichols and Thomas (joint paper), Great Britain; Passigli, Italy; de Timonoff and Lebedeff (joint paper), Russia.

Communication 10.—Terminology Adopted or to Be Adopted in Each country Relating to Road Construction and Maintenance.

Reports as follows: Voss, Germany; Hanisch, Austria; Bishop, Blanchard, Crosby, Dean, Hubbard, Pullar and Sharples (joint paper), United States; Limasset, France; Serraillier, Crompton, Kingston, Cowan, Killick, Kropf and Smith, Great Britain; Laknisky, Russia.

Saturday, June 28

Saturday, the last day of the congress, was taken up by excursions, four—Nos. 8, 9, 10 and 11—being scheduled for that day. Of the four, two were scheduled to take up only the one day, while two others provided for the return to London on June 30. Of the two latter, No. 10, as previously stated, was cancelled. Supplementary excursions Nos. 17 and 18 were also made.

Excursion No. 8 included an inspection of the experimental roads at Wandsworth, a visit to Hampton Court and to the National Physical Laboratory and an inspection of the Road Board Laboratory. The trip was made by motor buses and was taken by about 500 delegates.

Excursion No. 9 consisted of a visit to Letchworth Garden City, and included a demonstration of gyratory traffic, lunch, a drive and tea. About 250 delegates made the trip.

Excursion No. 11, to Brighton, was made in private motor cars, the route leading through Surrey and Sussex. The start was made from London on Saturday, Sunday was spent at Brighton and the return was made by rail on Monday. The itinerary included Croydon, Sutton, Epsom, Leatherhead, Dorking, Horsham and Henfield.

The excursion designated as No. 17 was a trip through Surrey in private motor cars. The route lay through a region of picturesque scenery and in addition afforded an opportunity to the delegates who made the trip to examine a large variety of different modern roadways.

Excursion No. 18 was a trip to the King George V Reservoir at Chingford. The delegates made the trip by motor bus and had lunch at Chingford.

At 7:30 in the evening a banquet was held at the Hotel Cecil, at which John Burns, M. P., President of the Local Government Board, presided, and several delegates spoke. About 250 of the delegates were present.

After proposing a toast to the King, Mr. Burns spoke as follows:

Gentlemen: The Third International Road Congress has met in London during the past week. In that period the Congress has held its sectional conferences, displayed its useful exhibition, and in many ways has taught to Londoners, and to those interested in this country, many useful and practical lessons upon road construction and administration. I sincerely trust that the lessons that have been taught have in some measure been learned by those whom the Government has very sensibly invited to the metropolis for this great and useful purpose. Its proceedings and reports will in due course be submitted to you, and I sincerely trust that the London Congress with its consequential valuable reports will be another, as it is the third, milestone, on the road to road and street improvement in every country in the world.

The subject that has brought you together is one with which every country is intimately, and should be wisely, connected. Good roads, clean streets, healthy thoroughfares, and may I say, beautiful avenues, are things to be secured, are realizable; and if the ratepayer and the taxpayer provide the means by which these objects can be secured, it is the business of the engineer, the surveyor, the administrator and the local authority, to see that the public, the ratepayer and the taxpayer get what they demand and that for which they pay.

In ancient times roads used to be the precursor of the conqueror and the paths of the invader, and it was only in those two respects that some countries knew what roads meant. The path of the conqueror has become excellent in modern times, because it has become the more sensible and the more useful because the more peaceable way. Lack of communication, isolation of communities—which means in the main lack of roads and continuous thoroughfares—has led in no small measure to much estrangement between communities, hostility between nations and misunderstandings between peoples, which the train and the good road ought to be, and are, the means of rapidly dispelling.

The train, important though it is; the ship, indispensable as we all know it to be; the tramway, essential as it is to modern communities—these are all but auxiliaries of a splendid system of road communication to which the train, the ship, the tramway, the 'bus, the motor and the taxicab are but subordinates. And, as an engineer, it is safe for me to say that the motor vehicle has in twenty years completed a greater revolution in communication than all other forms of traction have done in the preceding century. The people of every class and in every country demand cheap, popular and rapid traction, and without a road the tram and the 'bus are impossible. In dense aggregations of people such as we see in all civilized countries a good road is the essential, not only of communication, but of trade, of industry, of commerce, of health and of pleasure.

Modern forms of communication make increasingly a demand for wider, straighter and better roads. That demand for money must be met in some form or another. Science must respond to the demands that new traction has set up, and the ingenuity of the surveyor and the engineer can rise, if the taxpayer is willing to provide him with the money —must rise—equal to the demand that is increasingly being made on local authorities, engineers and surveyors. The aggregation of industry cannot be served by trades alone; the density of people and, above all, the economy of time that sensible men are rapidly demanding, the abolition of waste and dissipation of power, human and scientific and material, which slow forms of communication have hitherto meant, mean that people are demanding greater mobility; if in the country, quicker access to the town; if in the town, quicker and better and more frequent access to the countryside. And it is for you, as practical surveyors and engineers, to meet this demand by every means within your power.

These congresses of engineers and of administrators are frequently called to task by those whom they serve for the slowness with which new roads, boulevards and thoroughfares are constructed. Well, I have a word of caution to give to all of you—my invincible optimism is well known to most of my friends, and to some of my critics, but you have to be an invincible optimist if you are a country surveyor, and you have to be a disciplined enthusiast if you are a city engineer because on the least complaint, and with the smallest grievance, the ratepayer and the taxpayer want at once, sooner than they can be soundly built, roads like billiard tables, and thoroughfares as straight as an arrow.

Just as all roads lead to Rome, so Rome was not built in a day; and the kind of road that the super-critic is demanding of the engineer and the surveyor takes a considerable amount of money, a great deal of time, and much skill on the part of the superintendents—the foremen and the workmen—and patience, and a great power of organization on the part of the chief official who is responsible. In a word, I would urge you, whilst accelerating the speed at which good roads are being obtained in every country, I would ask you to remember that even in roads, raw haste is half-sister to delay; and you know from the countless trials you have had, the various experiences you have accumulated from all quarters of the globe, that you have not yet struck the best material, the finest foundation and a road universally applicable to all countries, and to all climates, and to all conditions of wear and tear. And the result is the public who criticizes you will have to be as patient in you working out your experiments as you are patient in laboriously trying on behalf of the public to secure the best possible road. But as one who travels a good deal, I am pleased to say and to think—and, incidentally, to thank you for it—there has been extraordinary progress in road making in recent years; road formation, road maintenance particularly, has been enormously improved. The cost in the aggregate has gone up, but I believe the public has secured value for the money which has been expended. There is room for greater progress, and I believe that if you get generous ratepayers and taxpayers and the President of the Local Government Board who looks after you—if with patience and industry on your part, and generosity on the part of the ratepayer, there is no reason why in the next ten or fifteen years the speed at which good roads have been secured in the last ten years will not be accelerated as your experience ripens and your knowledge by congresses like this expands.

Now, I want, if I may, to say a word or two on one aspect of the road that is sometimes forgotten—the growth of traffic. What it is that is responsible for the restlessness of modern mankind I do not intend to dogmatize on, but the fact is we are all more or less nomadic in our instincts; we want to move about for pleasure, even for rest and holidays when we are not at work; and the growth of travel, the modern habit of touring, especially by road, has thrown upon our road authorities a tremendous strain that many authorities are unable to bear. Now, I would urge you, as one who represented the ratepayers of a big city for eighteen years and has known the inside of the working of the central authority for the last seven or eight years, I would ask you to remember that the taxpayer is only a multiple of the ratepayer; and local authorities must bear this in mind, that it is not their business, nor is it their duty, to call upon the taxpayer, through the central authority, to pay all the cost for all their local roads. There has to be a wise, fair, practical and an equitable division of the cost of road making, construction and maintenance, and as invariably the taxpayer and ratepayer is only a unity of the same two persons it seems to me that you ought to be fair and reasonable—the local authority towards the state, and the state towards the local authority, and if the ratio of expenditure and grant-in-aid for the moment does not suit all of you, I can say that, so far as the state is concerned, through the agency of the department which Sir George Gibb ably controls, there is a desire to be fair, a desire to be generous and to be helpful in so far as the money at the disposal of the central authority will allow. And I would urge you to be patient with each other's complaints and grievances—the local authority not to ask Sir George for more than he has to give, and for Sir George to be microscopic and painstaking to see that those authorities, rich or poor, get the most who want it the most; and if, by a spirit of toleration and mutual goodwill—give on Sir George's part and take on yours, all in reasonable proportion, decently and in order—there is no reason why the relations between the central treasury and the local ratepayers should not be amicably adjusted upon sound and pleasant lines.

I want, if I may, to say a word or two about roads as I see them—I mean as President of the Local Government Board, and therefore, as Minister of Public Health. There is undoubtedly a new impulse for better roads—I do not mean wide thoroughfares like the radial roads you are often talking about—that the desire of every section of the community is for wider roads, for better thoroughfares, whether they are in back streets or whether they are in main roads. Both are demanded; in the first place, for easier travel; and in the poorer street they want an impermeable pavement and road because they want a cleaner street, because in the poorer street it is too frequently the only playground the children have, and the only rendezvous for the aged, and those who live in them; and I am very glad to say a good road is not only a sign of sanitation; it is a symbol of corporate wealth and civil progress; it is a standard of mobility, and a thermometer of a nation's desire to do justice to rich and poor in so far as good means of communication can provide it.

Let me give you only one instance. In my district, which I have the honor to represent in Parliament, we are noted in some respects as pioneers in the domain of municipal experiment, and in the matter of road maintenance and construction we may make our adjoining boroughs green with envy at the example we show them. But may I say that I find from our local surveyor that in 1905 the parish of Battersea spent £22,000 on the cleansing and the scavenging and the sweeping of its streets. The £22,000 of seven years ago has diminished to £16,000 last year. A considerable saving in cash. Now, I do not pretend for a moment that money has been saved for the ratepayers, but the money that was wasted on the old-fashioned flint and granite macadam road has been used to tarmac and otherwise pave the side streets that were too often neglected, and the money saved on the main roads by diminution of manure and refuse of all kinds, which was the result of the old flint and macadam road, has been diverted to cleaner streets in the poorer neighborhood with this result, that our medical officers, not only of our own district, but universally, are convinced that at least some of the wonderful diminution of infant mortality and children's diseases that has characterized the introduction of the impermeable road, and the tar paved street in the back thoroughfares, can be traced to the diminution of the dust due to the introduction of the motor vehicle, the tarmac, the wood, the asphalt and the other pavings. So in that respect great progress has been made.

From money I come now to material. It is marvelous, when you come to think of it, that in a parish with 86 miles of roads in seven years the yards of refuse should have been diminished from 46,000 yards to 23,000 yards—in less than seven years. Well, no wonder that fly-paper makers are going to the bankruptcy court. I am convinced that the disappearance of horse traction, the incoming of the motor vehicle, electric tram and the motor 'bus, and the oncoming of the tar paving in the side streets, has made a tremendous difference in the minor ailments and the general health of the whole community.

Now, may I here say a word—because we have a right to say it here, and because you are not responsible—you surveyors and engineers make the roads, pave the roads and cleanse the roads, but we must never forget that it is the public that ride and walk on them, and with wider roads has come greater traffic. This has meant high and relatively greater speeds. I believe that in certain towns and cities where the trade and commerce demand it, we shall have to make secondary and alternative roads for trade and commercial vehicles alone—if the public is to be protected from the risks and dangers that too often ensue. The public has a right to be protected from needless risk and intolerable danger, and when you engineers and surveyors have made the roads, when the ratepayer and taxpayer have jointly contributed towards their maintenance, I do think this Road Congress should sincerely appeal to every motorist, and every person who is in command and charge either of the bicycle, motorcycle, or commercial lorry, motor 'bus, or a taxicab—I do appeal to them to show in the most sportsmanlike way the spirit of the road, the true spirit of the road, that is, the inherent right of everyone to the road, and to do everything within their power by the cultivation of a neighborly spirit towards each other in the traveling they undertake greater regard for some people than some motorists are inclined to show. Our reason for saying that is this: Whatever restrictions you may impose, whatever regulations you may insist upon, whatever compulsion you may enforce, all these coercive methods are relatively useless unless the people by toleration, by good fellowship, by regard for each other, show that give-and-take upon the road which ought to be a characteristic of every section in every community which uses the roads. And when we have, as we had in London last year, nearly a regiment of people killed, and half an army corps injured in the streets of London alone, we have a right to make this appeal, as we now do, to all road users to be as tolerant to those who walk as they expect those who walk to be tolerant to those who ride.

May I add another point as a result of my official experience. Roads may be wide, but sometimes roads can be too wide. Roads may be straight, but I trust you will not be obsessed with the idea of having roads too monotonously straight. Hogarth was right when he said the line of beauty was in a curve, and if the curve is not too sharp and the circumference too narrow, I prefer a road with a curve in it to a road absolutely, monotonously straight.

I also would like to say another word. I see no reason why roads should not be more pleasant to look at than they generally are. You go through the National Gallery, or you go to Brussels, or you go to Paris, you look at a picture of an avenue or a road by Albemarle, the great painter of trees and avenues—you go to France, and you go to Germany, and all you foreign delegates will be pleased to see that good though our roads are so far as paving is concerned, narrow though some of them may be, they are in many cases things of beauty and joys forever to those who travel upon them, and I see no reason why when the surveyor or the engineer has done his part, and the architect and the town planner have done theirs, I see no reason why, alongside of fine roads, the waste on each side should not be kept tidier than in many cases it is, with the refuse heaps and half-used road material that too frequently has to stay there—that the place should be cleaned up and, generally speaking, all roads should pick up the artistic, if you like, the aesthetic, point of view, that in some countries good road makers have been able to carry out.

And, above all, may I put this to surveyors and engineers? I am told that generally speaking the best period for road making in this country is between October and March. If the Road Board give to you of the large sum of money it has collected—the sum in hand is not so large as the Road Board critics urge—but there is no reason why in a country where there is too much casual labor, and where unemployment sometimes rears its head, there is no reason why road making and road grading should not be used as a means of providing a large class of labor that would be unemployed between October and March with reasonable and remunerative occupation in doing work that reasonably can be deferred to the slack time of private industry and private commerce, and I trust that all of you will bear that in mind.

Now, Sir George Gibb, my last word is, as the author of the Housing and Town Planning Act, but a word. I am very sorry that road making in the past did not go hand in hand with town improvement and city development to the extent it should have done. I believe that road making of the future and town planning must go hand in hand, and both the town planner and the road maker must see that initially all the radial roads that lead in and out of large towns and cities, when they are in the condition of the bare field, ought to have at least a total width between the hedges, or the pavements, of anything from 70 to 100 ft. If it is not needed at once, it will be needed 10, 25 or 50 years hence, and you have a right to show prescience in design, foresight in construction, and always remember that the narrow street of today is the potential great thoroughfare of 25 or 30 years hence. And it will be the wisest and the best investment that local authorities and traders can make if they will give their engineers and their surveyors a relatively free hand in the widening of future roads and thoroughfares leading into and out of great towns and cities.

I am the last man in the world to suggest to foreign delegates, and to foreign countries, suggestions, rules and conditions that are only applicable to Great Britain and Ireland. On the Continent, in other countries, centralization in expenditure, revenue, contribution and in administration has gone much further than I believe people in this country will ever allow centralization to go in Great Britain and Ireland. We have, from King Alfred's time, been inured and conditioned to a system of local administration based upon free, popular, democratic local government. I believe we have too many local authorities. I believe there is a great dissipation of power, money and energy. There is room for further centralization; there is room for larger districts; for half-time engineers, and for part-time surveyors. There is room for more centralization, but just enough centralization, not too much. And I mention this because surveyors and engineers are sometimes restless under the parochial conditions under which they labor, and they sigh for a wider field of control, and an improved centralized scheme of supervision. To the surveyors and engineers I say "You must be patient. We recognize the difficulties of too small areas, and insufficient revenue, and the difficulty of getting more money, which must come from a larger district;" and I believe, as your experiments continue, and your movement grows, the central authority will be amenable

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CATALOGUES
6
GOOD ROADS

TWO OF THE EXHIBITS AT THE LONDON CONGRESS—AT THE RIGHT, THE BOOTH OF "GOOD ROADS," WHERE SAMPLE COPIES OF THE JOURNAL AND CATALOGUES OF AMERICAN FIRMS WERE DISTRIBUTED—AT THE LEFT, BOOTH OF JOHN HUTCHINSON, WHO EXHIBITED TESTING INSTRUMENTS, INCLUDING CROSBY'S CONSISTOMETER AND RICHARDSON'S PENETROMETER.

and sensible in adjusting the principle of local government to centralized advice, suggestion and coordination. Beyond that I do not think it necessary for the center to go.

My last word is, on behalf of the Government, to thank you most cordially for the honor you have done to London by selecting London as the scene and the place of your Third Congress. On behalf of the Government we wish the foreign delegates good luck in all their road enterprises, prosperity to each of their countries, and, above all, I am certain of this, of all the congresses I have ever attended there are few that have conduced more to a better understanding between the different peoples of the globe than the road congress that you gentlemen so worthily represent. The practical technical results of your gathering will widen your ideas, expand the domain of your experience, and from the mutual gatherings that you have had each country will learn from each other, and all will be pleased by these international gatherings that are increasing in number and that are a good sign for the world's progress; and certainly no congress will make more for the health, the pleasure, the leisure and the treasure of vast communities than the road congress that has concluded its week's labors; and I trust that when you meet in Germany, in the beautiful city of Munich three years hence, that the Germans will vie with England and London, as I am sure they will do, in making the Munich Congress as successful, useful and practical as the Third Road Congress has been in the city of London.

I propose the toast of "The International Road Congress," and I will call upon Sir George Gibb to respond to this toast.

The concluding function of the congress was a reception at the Hotel Cecil at 9 p. m.

EXHIBITION

The exhibition was held at the Royal Horticultural Hall and adjacent grounds. The exhibits were divided into four classes, as follows: Class 1, materials and tools; Class 2, traffic; Class 3, models, maps, drawings and publications; Class 4, historical. Class 1 was divided into two sections, one for materials and one for machinery—the first section including samples of broken stone and stone chippings, bitumens of various kinds, samples of surfaces and testing apparatus, and Section 2 including road rollers, driers, mixers, crushers, scarifiers and other machinery used in road and street construction and maintenance. Class 2 was divided into three sections. Section 1 consisted of mechanical vehicles for carrying road materials, wheels and tires designed for supporting heavy loads, non-skid apparatus designed so as not to injure the road surface, and light railway and tramway tracks. Section 2 comprised exhibits of horse traction devices, including wheels and tires, non-injurious horseshoes and the like. Section 3 consisted of apparatus for the illumination of highways and vehicles. Class 3 included models, maps, drawings, publications, statistics, account forms, meteorological records and the like, and Class 4 included specimen sections of road construction, past and present, and varied historical exhibits.

A large part of the exhibition comprised exhibits that were not of a commercial nature, though most of the exhibits of material and machinery in Class 1 and the exhibits in Class 2 were of a commercial character. Among the non-commercial exhibits were those of the Road Board, which comprised maps, signposts, sections of road, etc. Although British firms comprised the majority of exhibitors, other countries, including the United States, were represented. A list of the exhibitors follows:

Aitkin Taroads Syndicate, Glasgow, Scotland.
American Westrumite Co., London, England.
Anglo-American Oil Co., Ltd., London, England.
Anglo-Mexican Petroleum Products Co., Ltd., London, England.
Archer, W. & F., London, England.
Aveling & Porter, Ltd., Rochester, England.
Barber Asphalt Paving Co., Philadelphia, Pa., U. S. A.
Barford & Perkins, Peterborough, England.
Bristowe & Co., Ltd., London, England.
British Graetzin Light, Ltd., London, England.
British Reinforced Concrete Engineering Co., Ltd., London, England.
British Trust Corporation, Ltd., London, England.
Brookes, Ltd., Halifax, England.
Canadian Mineral Rubber Co., Ltd., London, England.
Ceiriog Granite Co., Ltd., Chirk, North Wales.
Chemical Engineering Co., London, England.
Clare, R. S. & Co., Ltd., Liverpool, England.
Clayton & Shuttleworth, Ltd., Lincoln, England.
Compania Anonima, Bilbao, Spain.
Crompton Laboratory, London, England.
Durax Dustless Roads, Ltd., London, England.
Eggers, Friedrich, Hamburg, Germany.
Ellis & Everard, Bardon Hill, England.
Enderby & Stoney Stanton Granite Co., Ltd., Narborough, England.
Gas Light & Coke Co., London, England.
Giant's Causeway Columnar Basalt Co., Ltd., Portrush, County Antrim, Ireland.
"Good Roads," New York, N. Y., U. S. A.
Goodwin, Barsby & Co., Leicester, England.
Gourdin, Charles, Usines de Saulnieres, France.
Green & Son, Thomas, Leeds, England.
Hadfield's Steel Foundry Co., Ltd., Sheffield, England.
Hall, J. & E., Ltd., London, England.
Hard York Nonslip Stone Co., Halifax, England.
Heskett Steel Castings (British), Ltd., London, England.
Highways Construction, Ltd., London, England.
Hill, J. & P., London, England.
Hutchinson, John, London, England.

ONE OF THE ROAD MATERIAL EXHIBITS AT THE LONDON ROAD CONGRESS.

Iliffe & Sons, Ltd., London, England.
Improved Wood Pavement Co., Ltd., London, England.
Johnston Bros., London, England.
Limmer Asphalte Paving Co., Ltd., London, England.
Mann's Patent Steam Cart & Wagon Co., Ltd., Leeds, England.
Manuelle, A. & F., Ltd., London, England.
Marsden, Ltd., H. R., Leeds, England.
Murphy, Stedman & Co., Ltd., London, England.
Neuchatel Asphalte Co., Ltd., London, England.
Patent Lightning Crusher Co., Ltd., London, England.
Phoenix Engineering Co., Ltd., Chard, England.
Pyx Granite Co., Ltd., Malvern, Worcestershire, England.
Ransome-ver Mehr Machinery Co., Ltd., London, England.
Roadamant Co., Ltd., London, England.
Roadite, Ltd., London, England.
Roads Improvement Association (Incorporated), London, England.
Rocmac, Ltd., London, England.
Ruston, Proctor & Co., Ltd., Lincoln, England.
Skandinaviska Granitaktiebolaget, Gothenburg, Sweden.
Societe Anonyme des Mines de Bitume et d'Asphalte du Centre, Paris, France.

Societe des Carrieres d'Olloy Societe Anonyme, Olloy, Belgium.
Standard Tar Co., Ltd., London, England.
Stothert & Pitt Ltd., London, England.
Strassenbau-Gesellschaft Wayss M. B. H., Frankfurt, Germany.
Tarmac, Ltd., Wolverhampton, England.
"The Car" Illustrated Ltd., London, England.
"The Surveyor and Municipal and County Engineer," London, England.
Trinidad Lake Asphalt Paving Co., Ltd., London, England.
Val de Travers Asphalte Paving Co., Ltd., London, England.
Verband der Steinsetzer Pflasterer u. Berufsgenossen Deutschlands, Berlin, Germany.
Webb Lamp Co., Ltd., London, England.
Weeks & Son, Ltd., Maidstone, England.
Wells & Co., A. C., London, England.
Wilton's Patent Furnace Co., London, England.
Yorkshire Commercial Motor Co., Leeds, England.

New Highway Law in Illinois

A new law governing highway administration and providing for state aid in the improvement of roads was passed by the Illinois State Legislature at its last session and approved by Governor Dunne June 27.

The law authorizes the establishment of a State Highway Department composed of the three members of the State Highway Commission, the Chief State Highway Engineer, the assistant State Highway Engineer and various subordinate officers. By the terms of the new law the members of the State Highway Commission are appointed by the Governor. The terms of office of the first appointees are two, four and six years, respectively. On March 1, 1916, and every two years thereafter the Governor is directed to appoint a successor to the member of the commission whose term shall have expired, the term of service being designated as six years. Each commissioner receives an annual salary of $3,500, and expenses. One of the members of the commission is designated when appointed as the president of the commission, and acts as the executive officer.

The Governor is authorized to appoint the Chief State Highway Engineer and Assistant State Highway Engineer. Both must be experienced in highway construction and maintenance. The salary of the chief is placed at $4,000 per year and that of the assistant as $2,500.

The law places upon the State Highway Commission the general supervision of highways and bridges constructed or maintained by the aid of state funds and directs it to advise and aid county officials in the establishment of grades and drainage systems, to approve maps and plans, and to let all contracts for construction of state aid roads.

All officers of the State Highway Department other than the members of the State Highway Commission, the Chief State Highway Engineer and the Assistant State Highway Engineer, must be appointed according to the state civil service regulations.

Article III of the new law provides for the appointment of county superintendents of highways, one for each county in the state. These officials must be selected by the State Highway Commission by competitive examination from lists of three to five persons submitted by each board of county commissioners. County superintendents of highways are appointed for terms of six years. The salary of each is determined by the board of commissioners of the county in which he serves. The duties of the county superintendent of highways are to supervise the repair and maintenance of all state aid roads within his jurisdiction, to act for the county in all matters pertaining to highway work done at the expense of the county and to prepare plans, specifications, etc., for bridge construction in the county, all subject to the approval and direction of the State Highway Commission.

Article IV authorizes the construction of highways at the joint expense of the state and the counties, the cost to be divided equally. The boards of supervisors in counties under township organization or boards of county commissioners in counties not under township organization are directed to designate highways to be improved by state aid, the roads thus selected to connect as nearly as possible the principal cities and trading points in each county with each other and also with similar points in other counties. The roads designated must be approved by the State Highway Commission. No state aid road can include a portion of highway within the limits of an incorporated city or village, nor can the total mileage of state aid highways in each county exceed 15 per cent. of the total mileage of roads in counties of the first class or 20 per cent. in counties of the second class. By the terms of the act, improvement of any road by state aid is initiated by resolution by the board of county commissioners in which the proposed improvement lies. Counties may issue bonds, if so authorized by the voters, to pay their shares of the expenses.

State aid roads are maintained under the direction of the State Highway Commission and wholly at the expense of the state. The law directs the State Highway Commission to purchase all machinery, tools and other equipment for the work of repair and maintenance and to employ or authorize the Chief State Highway Engineer to employ all necessary labor therefor. Allotments of bonds for state aid are made as follows: From such appropriations as the General Assembly shall make from time to time for carrying out the provisions of the act, there shall be allotted each year to each county an amount that shall bear the same ratio to the total appropriation for the year that the amount levied for roads and bridges in each county bears to the total amount levied for that purpose in the state.

Article V authorizes counties to build bridges wholly at their own expense or jointly with townships or road districts.

Article VI directs that all counties not working under township organization be divided into road districts. In each township in counties under township organization and in each road district the law requires the election of a board of highway commissioners. In counties under township organization, the elections of highway commissioners are held at the annual town meeting. In all other counties elections must be held on the first Tuesday in April of each year. One commissioner is elected each year for a term of three years. The members of the board must elect one member president. The law designates the salary of members of the boards of highway commissioners as $2 per day. The boards of highway commissioners are directed to determine taxes for road and bridge construction; to direct the construction and repair of roads and bridges within the town or district and to let contracts for the work. Contracts for construction or repair involving more than $200 must be approved by the county superintendent of highways.

The law authorizes the levy of a poll tax of $3 for highway purposes on all able-bodied men residing outside the limits of incorporated cities or villages. These poll taxes must be paid in cash.

Provision is made for the construction of gravel, rock, macadam or other hard surfaced roads in townships or road districts as follows: Upon petition by 25 per cent. of the landowners of the township or district, the question is submitted to the voters at the regular town meeting or district election. If a majority of the voters favor the construction of the road, a tax is levied for the purpose. Loans may also be negotiated to pay the cost of such improvement.

Article IX provides that upon petition by 25 legal voters of any district or township, a special election may be called and if a majority of the voters so decide, the three-headed highway commissioner system may be abolished and a single commissioner system established. The law fixes the compensation of the commissioner at $3.50 per day in counties of the first class, $4 in counties of the second class and $5 in counties of the third class.

Wood Pavements in the United States*

By GEO. W. TILLSON, C. E.†

No definite information can be obtained of the early wood pavements of the United States, but it is known that some existed in New York, Philadelphia and Boston in 1840. These pavements were constructed of different kinds of wood, many of them hemlock, and in many different and unsystematic ways. Consequently they soon wore out or decayed, the wonder being not that they failed but that they did good service for any appreciable length of time.

The question of paving of all kinds was a vital one in America at this time, and in 1843 a committee of engineers was appointed by the Franklin Institute of Philadelphia to examine into the subject and report upon the best material for Philadelphia. This committee examined the entire subject thoroughly and reported in detail, referring to wood pavements that had been laid in Philadelphia mostly of hemlock but some of cedar, nearly all of which had practically failed after four years of service. They concluded their deductions in regard to wood pavements as follows:

> Finally, in consequence of the slippery nature of the surface, their deficiency of durability when of ordinary timber, of their expense in the ultimate, and in view of results of experience as far as they have become known to us, we are reluctantly impelled to the conclusion that, although their use may be proper in some detached situations, wooden pavements ought not at this time to be recommended as part of the general system of paving by the City of Philadelphia.

In 1872 the mayor of Boston appointed a Committee to investigate the matter of wooden pavements. This committee, after a careful investigation, made a report the following year. One of its conclusions is as follows:

> So far as your commissioners know, there is no wooden pavement in this city which has been down long enough to afford a proper test which does not show considerable deterioration, owing to either defective treatment or defects in construction, and they have not been able to find a preservative process cheap and efficient enough to recommend to the city without qualification.

This committee offered a premium of $300 for an essay on the most effectual method of preserving wood pavements, and in the essay accepted it is stated:

> To sum up, with especial reference to wooden pavements, we are to decide upon a process which is sufficiently effective, suitably cheap, and applicable to the particular qualities of wood at our disposal. As a matter of economy, if for no other reason, pine wood is commonly used, and that without having been seasoned. Coal tar oil, then, is barred out from our consideration, on account of its being suitable only for winter cut hard woods. Moreover it is too costly.
>
> Taking all things into account, then, I am inclined to give preference to the process of Burnettizing.

This process, as is well known, consists of treating the wood with chloride of zinc.

The pavements laid in Boston and New York seemed to have had practically the same experience as the Philadelphia pavements.

Soon after the Civil War, however, the question of wood pavement was again considered, and between 1860 and 1870 a large amount of wooden pavement was laid under what is known as the Nicholson patent. The Nicholson pavement consisted of white pine or southern yellow pine, sawed so as to be 3 ins. thick and 6 ins. long; the blocks were untreated and were laid on a flooring of common pine boards 1 in. in thickness. This flooring was laid on a sand bed, lengthwise of the street, the ends resting on similar boards laid across the street from curb to curb. The flooring was tarred on both sides with hot coal tar. Upon this flooring the blocks were set in parallel courses, transversely with the line of the street. Each block before being laid was dipped to half its height in hot coal tar. The courses of the blocks were separated by pickets placed along the faces of the blocks, to which they were nailed. These pickets filled the lower 2 ins. of the joint, the space above being filled with roofing gravel and coal tar, which were rammed by means of a paver's rammer and an iron blade made specially for the purpose. The coal tar was applied hot so as to thoroughly fill the interstices of the gravel. When the pavement was entirely completed it was covered with fine sand and gravel to a depth of ¾ in. This pavement in Brooklyn cost $4.50 per sq. yd., exclusive of the grading and the preparation of the foundation, for which an additional sum of 50 cts. per sq. yd. was paid.

The pavement was particularly pleasing, both in appearance and for traffic, when first laid, but on account of the variable quality of the blocks it wore unevenly, and on the average had a life of only about six years. Other pavements similar to the foregoing, but laid with some difference in detail, were also used at this time.

When these pavements decayed bituminous pavements were beginning to come into use, and in many instances the wood blocks were simply covered with a coal tar wearing surface, which in turn when worn out was covered over with ordinary sheet asphalt. These streets have practically been entirely taken up and relaid with a concrete base, but some two years ago, when the last one was repaved, some of the old pine blocks were found to be as sound as when laid, although the great majority had entirely disappeared.

Between 1880 and 1890, when there was a general real estate boom through the middle West, another form of wood pavement was used, which had been tried slightly in Washington but never adopted there as a permanent form of pavement. The blocks were made of cedar posts, from which all the bark had first been removed, sawed into pieces 6 ins. long by gang saws cutting from six to eight pieces at a time. These blocks varied in diameter according to the dimensions of the posts, but the specifications generally called for them to be from 4 to 8 ins. in diameter, but if larger blocks were used they were to be split before being laid. This pavement was never considered to be permanent, but, on account of its cheapness and availability in the West, it was used quite extensively in cities where relief from bad streets required immediate attention. The city of Chicago, Ill., used more of this class of pavement than any other city, its quantity at one time reaching as high as 750 miles, although at the present time it has practically all been replaced by modern pavements. It cost in Chicago, on an average, about 85 cts. per sq. yd., and its life was about nine years, it being understood that this life was determined, not by the traffic on the street, but the ability of the wood to withstand decay. When it was seen how little durability this pavement possessed its use in general was soon abandoned. It was, however, continued in Chicago longer than in other cities for reasons heretofore given.

The advantages of wood pavement, however, were such that, notwithstanding the many failures that had occurred, the idea of eventually using wood as a paving material was not abandoned. The city of Indianapolis, Ind., was the first city to take up seriously the question of laying chemically treated wood blocks. This city in 1896 laid a few streets with blocks of red cedar from the state of Washington. The contract for this work provided that the blocks should be thoroughly dried in a vat at a temperature of 200° F. and then submerged in creosote oil heated to a temperature of over 200° F., remaining there for at least six hours. It was estimated that this treatment would amount to about 3 lbs. of oil per cu. ft. The blocks were laid at an angle of 45 degrees with the curb, no provision being made for expansion, and the joints were filled with paving pitch. These streets gave a little trouble on account of bulging caused by swelling of the pavement in wet weather, but not to any great extent. These pavements are still in use and said to be "in a splendid state of preservation." These streets were so satisfactory that a more elaborate treatment was undertaken subsequently, the blocks receiving a treatment of 10 lbs. of creosote oil per cu. ft., with certain specification requirements for the oil. These experiments in Indianapolis were received almost with merriment by many of the leading highway engineers of the country, but they demonstrated most fully the truth of that old saying, "Nothing succeeds like success," for the attention of other cities was gradually drawn to these Indianapolis pavements and the many good points which they showed.

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As a result of some investigation in the method of treating blocks there was devised a method which was known as the creo-resinate process. This consisted of impregnating the blocks with a mixture composed of one-half creosote and one-half resin, the early specifications having no requirement for the character of the oil; the idea being that as the creosote was a good preservative, if it could be kept in the blocks they would last until they were worn out, but if used by itself, being so volatile, it would evaporate and the blocks would decay long before they had become destroyed by traffic. The object of the creosote then was to preserve the blocks and of the resin to prevent the volatilization of the oil. The first pavement of this character was laid on Tremont St., Boston, opposite the Common, in 1900. This pavement in the latter part of 1912 was said to be in such good condition that it would probably remain intact for ten years. In 1902 a sample pavement of one block was laid in Brooklyn, N. Y., with creo-resinate blocks, and later a general specification for same was adopted. This required that the wood should be long leaf yellow pine and that the blocks should be treated with a mixture composed of one-half creosote oil and the other half resin or some other suitable waterproofing material; no attempt was made to regulate the character of the oil. The blocks were to have such waterproof qualities that, after having been dried in an oven for twenty-four hours at a temperature of 100° F., they should not absorb more than 3 per cent. of water after having been immersed for 24 hours. It was also required that all blocks after treatment should sink in water. The object of requiring the immersion test was that the blocks should be so treated that they would be stable in size, not swelling in damp weather, and so, by bulging, causing deformation of the pavement, nor shrink to an undue extent in dry weather. The requirement that the blocks should sink in water was made because it was realized that it would be somewhat difficult to ascertain how much treatment was given to the blocks, the process being carried out some miles from the city, and it was thought that if they sank in water it would be proven that approximately 20 lbs. per cu. ft. had been used or that the blocks were of such a character as not to require so much treatment. The blocks were laid on a ½-in. mortar bed formed of one part Portland cement and four parts sand, this mortar bed being spread on a substantial concrete foundation. The joints between the blocks were filled with fine dry sand, and the pavement was laid without expansion joints. Almost no trouble has occurred on city streets laid under these specifications on account of bulging.

It soon developed that if much of this class of pavement was used and the same amount of resin as of oil used that the cost of the treatment would be very large. Consequently in the Borough of Manhattan, New York City, a specification was adopted by which only 25 per cent. of resin was required, but the specific gravity of the oil was fixed at 1.12. In the course of a few years the question arose as to the propriety of doing away entirely with the resin and using only creosote oil. A committee was appointed by the Board of Estimate and Apportionment, consisting of the pavement engineers of the different city boroughs together with the Chief Engineer of the Board and the Chief Engineer of the Finance Department, to prepare a standard specification for wood block pavement. This committee investigated the matter carefully and adopted a specification omitting the resin entirely and having the following requirements for the treatment of the blocks:

> The blocks shall be so treated with an oil elsewhere described that the pine blocks shall contain not less than 20 and the gum blocks not less than 22 lbs. per cu. ft. After treatment the blocks are to show such waterproof qualities that after being dried in an oven at a temperature of 100° C. for a period of 24 hours, weighed and then immersed in clear water for a period of 24 hours and again weighed, the gain in weight is not to be more than 3½ per cent. for pine blocks and 4½ per cent. for gum blocks.
>
> The oil with which the blocks are to be treated shall be a stable, antiseptic and waterproofing oil from which the water has been removed by distillation, and which shall have a specific gravity of not less than 1.12 at 38° C. When distilled in the manner hereinafter described, the oil shall lose not more than 35 per cent. up to a temperature of 315° C. The distillate between 255° C. and 315° C. shall have a specific gravity not less than 1.02, the said specific gravity being taken at a temperature of 60° C.

Some of the manufacturers who appeared before the committee argued in favor of the use of oil manufactured from water gas tar. The committee did not feel that there had been sufficient experience to warrant this, but was willing that a mixture of water gas tar oil and coal tar oil should be used, provided, however, that not more than 50 per cent. of water gas tar oil should be used. The requirement that the distillate between 255° C. and 315° C. should have a specific gravity not less than 1.02 at a temperature of 60° C. was made in order to maintain this limit.

The foregoing gives briefly the development of the specifications for creosoted paving blocks in the East. In other sections of the country the process was about the same, except possibly the provision in the New York specifications allowing the mixing of oil from water gas tar with coal gas tar oil for the preservative; and it is extremely doubtful if this provision was ever taken advantage of in New York.

In considering requirements for specifications for wood pavements, there are several points that must be taken into account, some of which the municipal engineers are generally agreed upon and others upon which there is a wide difference. These points are: Kind of wood to be used and the size of the blocks, the character of the preservative as well as the amount to be used, the cushion coat on which the blocks are to be laid, the filler for the joints, and the necessity for an expansion joint.

Kind of Wood

The cost of lumber in the United States during the last few years has been so great that the first cost of the blocks is an important consideration, and while it is generally considered that long leaf yellow pine makes the most durable blocks, it is questionable if other varieties cannot be used either locally or on light traffic streets. The kinds of wood generally admitted by the different specifications are long leaf yellow pine, black gum, Norway pine and tamarack. It is probable, however, that if the work is to be done in the far West, some such wood as Oregon fir or Washington cedar could be substituted for these other materials with good results. As has been said, the long leaf yellow pine makes an extremely durable pavement, but it is produced only in one section of the country, so that transportation charges are high, and, when the traffic and local conditions will permit, it is desirable to use a cheaper material.

Some four or five years ago the United States government laid as an experiment, on a street in Baltimore, a wood pavement made up of a great many different kinds of wood, all treated with 1.09 creosote oil, the idea being to ascertain the relative merits of these different kinds so that a selection of material could be made according to the traffic on any particular street or the availability of any material. The kinds of wood used were long leaf pine, Norway pine, tamarack, Douglas fir, western larch, white birch and hemlock. The long leaf pine was used to serve as a standard of comparison. The conclusion reached after the examination of the pavement, four years after it had been laid, was that:

> The species used will be tentatively grouped in accordance with the results of this inspection in the order of their value for creosote oil paving material as follows:
> 1. Long leaf pine.
> 2. Norway pine, white birch, tamarack, Eastern hemlock.
> 3. Western larch.
> 4. Douglas fir.

In the East, as a matter of fact, the long leaf yellow pine has been used almost entirely up to the present time, the principal exception being black gum. This, however, has not given entirely satisfactory results. The yellow pine, while particularly good as to wearing qualities, is, for that reason, more slippery and from the formation of the wood likely to split, so that the blocks are often destroyed when taken up to permit of carrying on any underground work. It is probable, however, that on the whole it is the most satisfactory wood for general use.

In the West tamarack has been used slightly, with very satisfactory results.

Size of Blocks

Not very much difference exists in the practice of the engineers on this point. The first blocks were generally 4 ins. in width, but the more recent practice has been to reduce this width to 3 ins. The permissible length is generally from 5 or 6 to 10 ins., this range in length being given so as not to increase the price by selecting lumber all of one particular width. A difference of one dollar per thousand in the price of the lumber adds 4 cts. per yd. to the cost of the pavement. The depth should be governed by the traffic on the street, although, as the blocks are small, they must have sufficient depth to be stable, irrespective of traffic. The indications are from the present experience that the actual wear from traffic on hard pine blocks on an average street is very little, and that, so far as that is concerned, a block 3½ ins. deep would probably last for 20 or even 25 years. Its tendency to split, however, makes it advisable to use a greater depth if the funds will permit.

In this connection it might be said that a small bridge was paved in Brooklyn some years ago with wood blocks, laid upon an old wooden foundation that was extremely irregular and not solid enough to preserve the surface of the pavement under the traffic to which it was subjected. The blocks soon split into pieces averaging about 2 ins. square, but, on account of their not being disturbed; the pavement was very durable, lasting some three or four times longer than the surface which had been previously used.

Character of Preservative and Amount to Be Used

This is a point upon which there is a great divergence in the practice of different engineers. In determining it, however, it should be understood that the preservative has two functions, one to act as an antiseptic and so prevent the block from decay, and the other to act as a waterproofing material, so that the blocks may remain stable and not absorb water, causing expansion when wet, or allowing too much contraction in a dry spell and thus making the blocks loose. Although an oil of antiseptic properties is desirable, it is probable that if water could be kept entirely from the inside of the blocks there would be no decay. This, however, is an exceedingly difficult matter and probably impossible. It seems desirable that a preservative should be selected that in itself will be stable and remain in the blocks as long as possible, for on residence or light traffic streets the life of a wood pavement will be determined mainly by its ability to withstand decay and not the wear and tear of traffic.

The two main points at issue in the character of the preservative are its specific gravity and its origin. Some argue that the specific gravity of the oil should be approximately from 1.08 to 1.12, the so-called heavy oil, and others from 1.03 to 1.06, the so-called light oil; some also argue that the oil should be a distillate of coal tar, while others would admit oil manufactured from water gas tar. The experience of the past in treating wood demonstrates that an oil from coal tar does make a good preservative, and while the same results might be obtained from a water gas tar product, the experience with this material has not been such as would warrant engineers using it freely. The Borough of Manhattan, New York City, is laying an experimental wood pavement, which, among other features, will have blocks laid with coal tar oil and water gas tar oil under similar conditions, both as to material and traffic, making an attempt to determine the relative merits of these two oils. The advocates of the heavy oil recognize that it is not absolutely a distillate oil, and so not similar to what is generally recognized as creosote, but that its specific gravity is attained by combining distilled creosote oil of approximately 1.05 specific gravity with coal tar from which the water, light oils and excess of free carbon have been removed.

In the construction of wood pavements with creosote oil a certain amount of trouble has been caused by the exudation of the preservative upon the surface of the blocks soon after they have been laid, especially in hot weather, causing great inconvenience, particularly to foot passengers, as the surface is often covered with a thick, tarry substance which is exceedingly disagreeable. This exudation ocurs when both the light and the heavy oils are used, although the advocates of light oil claim that it occurs much more frequently and to a greater extent with the heavy oils.

Quantity of Oil

This is a point, too, upon which the engineers differ, the quantities used for pine and similar blocks ranging from 14 or 15 lbs. up to as high as 20 lbs. per cu. ft. The quantity of oil used would undoubtedly make a material difference in the amount of exudation in hot weather, but this exudation does not continue for any extended length of time, and it can be taken care of by spreading sand over the pavement surface so as to absorb the exuded material. The action which causes it necessarily brings the material to the surface of the block, so that the pores at the surface must be thoroughly filled, and so cause the block to be as nearly waterproof as it possibly could be, giving after this excessive exudation has ceased a perfect surface so far as absorption of water is concerned. Experiments and experience are necessary in order to determine just what is the required amount of oil to be used. Its cost makes it an important factor in the cost of the pavement, so that it is important that no more should be used than is necessary. At the present time it is considered that on a heavy traffic street less oil can be used per cu. ft. than on one of light traffic.

Cushion Coat on Which the Blocks Are to be Laid

The early Brooklyn pavements referred to were all laid on a cushion coat of sand and Portland cement, mixed in proper proportions and with just enough water to allow the mortar to set. The blocks were rolled down to an even, smooth surface and not disturbed until the cushion coat was thoroughly hard. Recently a cushion of sand has been used in many instances, but the author believes that the mortar cushion gives the best results. It might be claimed that the pavement could be opened for traffic more quickly if a sand cushion were used than with one of mortar, but if traffic is kept completely from the pavement, the blocks can be laid before the foundation concrete has thoroughly set, so that the setting of the cushion coat and the concrete base can go on simultaneously.

Joint Filling

The practice in this regard has been to use sand, cement and bituminous fillers. The advocates of the sand filler claim that if a fine, dry sand is used the joints will be completely filled and that under traffic the surface of the street soon becomes practically homogeneous and that the sand in the joints will absorb a certain amount of the exudation of the preservative from the blocks and so make an absolutely waterproof joint. The advocates of the cement grout filler argue that it is necessary to use this material so that the joints will be absolutely full and remain full. The grout when used is generally made up of a mixture of one part of sand and one part of Portland cement, with enough water to flow freely into the joints. The opponents of this method argue that unless the pavement is kept free from traffic long enough to thoroughly set, which it is difficult to do, the bond of the mortar is broken, and even if not broken it has not sufficient strength to resist traffic, so that in either event nothing better than a sand joint is obtained notwithstanding the increase in price. The advocates of the bituminous filler argue that if the joints are filled with coal tar or an asphaltic preparation, or some other similar substance, each joint is practically an expansion joint and that it will allow a certain expansion of the pavement as a whole without any bulging which with the same expansion would take place if a solid filler like sand or cement grout were used. The opponents argue that by the use of this filler, when the preservative exudes from the blocks, as it must to a certain extent, the bitumen in the joints simply adds to the nuisance which is caused by the exudation of the preservative on the surface of the street. In actual practice the sand and bituminous fillers are most generally used.

Expansion Joint

Although the treatment of the blocks is supposed to prevent the absorption of water, causing expansion of the pavement, in practice it is impossible to have the blocks entirely waterproof, so a certain amount of expansion must take place. Provision for this is made by allowing a space along the curb, which is filled with some kind of bituminous material. For a roadway 30 ft. wide this expansion joint is generally from ¾ to 1 in. in width. No provision is made for taking care of longitudinal expansion, except in the city of St. Louis, although the pavement is continuous for a distance many times the width of the street. No more trouble seems to be caused by expansion in this direction than transversely. Some claim that the bulging is produced by the transverse expansion on account of the crown of the pavement, so that when the pressure is created the resistance to the lifting of the pavement is less than to the compression of the blocks and the result is that the pavement bulges along this line of least resistance. This theory might, to a certain extent, account for the lack of bulging by longitudinal expansion.

In the Brooklyn and Manhattan pavements no expansion joints are provided for, and as has been said, very little trouble has been caused by bulging when the material has been yellow pine and when the absorption test has been maintained. The result of this experience would seem to demonstrate that in the climate of New York City, at least, no expansion joint is necessary.

In the United States there are two organizations which have taken up in detail the matter of wood block specifications. Both are formed of city officials, and one is known as the American Society of Municipal Improvements, the other as the Association for Standardizing Paving Specifications. This latter organization has had three meetings and has adopted specifications for wood pavements at each meeting; the American Society of Municipal Improvements has adopted specifications at one meeting only.

So that it may be known what the practice is of the engineers of the principal cities of the United States using wood pavements, the requirements of the specifications, as well as those of the two organizations, will be given on each of the general points previously discussed. In this statement the American Society of Municipal Improvements will be designated as "The Society" and the Association for Standardizing Paving Specifications as "The Association." It must be remembered that the specifications are constantly changing, but those here given represent the practice in 1912.

Kind of Wood

The Association.......	Southern yellow pine, Norway pine, black gum, tamarack.
The Society...........	Long leaf yellow pine, Norway pine or tamarack.
Borough of Manhattan, New York City......	Southern long leaf yellow pine.
Chicago................	Southern yellow pine, and tamarack.
Cincinnati............	Southern yellow pine, Norway pine or tamarack.
Philadelphia..........	The same as the Association.
Minneapolis...........	Southern yellow pine, Norway pine, Washington fir or tamarack.
St. Louis..............	Southern yellow pine.

Size of Blocks

The Association.......	5 to 10 ins. long, to average 8 ins.; 3 to 4 ins. in width, 4 ins. in depth, except on medium traffic and light traffic streets or alleys, where the depths can be reduced to 3½ and 3 ins., respectively.
The Society...........	5 to 10 ins. long, to average 8 ins.; 3½ to 4 ins. in depth and width, according to traffic; light traffic streets, 3 ins. in depth.
Borough of Manhattan.	8 ins. long, 3 ins. in width, 4 ins. in depth.
Chicago................	5 to 10 ins. long, to average 6 ins.; 3¾ ins. in width, depth 4 ins., except in special cases.
Cincinnati............	6 to 10 ins. long, to average 8 ins.; 3 ins. in width, 3½ ins. in depth.
Philadelphia..........	Same as the Association.
Minneapolis...........	5 to 10 ins. long, to average 8 ins.; 4 ins. in width, 3¼ or 4 ins. in depth.
St. Louis..............	Not less than 6 ins. long, to average 8 ins.; 3 or 4 ins. in width, not less than 3½ ins. deep.

Treatment (Character)

The Association.......	Specification A: The preservative to be a product of coal gas, water gas, or coke oven tar, free from all adulterations contained in raw or unfiltered tars, petroleum compounds, or tar products obtained from processes other than stated; specific gravity not less than 1.10 nor more than 1.14 at a temperature of 38° C. Specification B: Preservative to be a distillate of coal gas or coke oven tar, free from all adulterations, and contain no raw tar, filtered or unfiltered tars or pitches, petroleum compounds, or other tar products; specific gravity not less than 1.03 nor greater than 1.08 at 38° C.
The Society...........	Oil to be a coal tar product, free from adulteration of any kind; specific gravity at least 1.10 at a temperature of 38° C.
Borough of Manhattan.	Oil to be a stable, antiseptic and waterproofing oil from which the water has been removed by distillation, and which shall have a specific gravity not less than 1.10 at 38° C. (Further description given in previous portion of this paper).
Cincinnati............	Oil A: The oil to be the best obtainable grade of coal tar creosote, a pure distillate of coal tar and free from admixtures of oils, tars or substitutes that are not pure coal tar; specific gravity to be at least 1.04 at a temperature of 38° C. Oil B: The oil to be a coal tar product, free from adulteration of any kind whatever; specific gravity to be at least 1.10 at a temperature of 38° C.

Chicago	Oil to be a distillate oil obtained only by distillation from coal tar; no other material of any kind to be mixed with it; specific gravity to be not less than 1.08 and not more than 1.12 at 25° C.
Philadelphia	The same as the Association.
Minneapolis	Oil to be a pure heavy coal tar product only; specific gravity to be at least 1.10.
St. Louis	The preservative to have a specific gravity of not more than 1.08 at a temperature of 38° C.

Treatment (Amount)

The Association	Pine and tamarack blocks to contain not less than 18 lbs., and gum blocks not less than 22 lbs. per cu. ft.
The Society	20 lbs. per cu. ft.
Borough of Manhattan.	20 lbs. per cu. ft.
Chicago	20 lbs., probably to be changed to 16 lbs. per cu. ft.
Cincinnati	18 lbs. per cu. ft.
Philadelphia	Same as the Association.
Minneapolis	No amount specified, but to be so treated as to be impervious to water and to prevent decay.
St. Louis	16 lbs. per cu. ft.

Each specification contains requirements for the amount of the distillate at certain temperatures, but they do not vary much for the same kind of oil.

Cushion

The Association	Cement mortar composed of 1 part of Portland cement and 4 parts of sand, not to exceed 1 in. in thickness; under special conditions mortar cushion to be omitted and a bituminous coating substituted therefor.
The Society	Either a sand cushion 1 in. in thickness or mortar 1 in. in thickness made of 1 part of Portland cement and 3 parts of sand.
Borough of Manhattan.	1 in. of sand.
Chicago	1 in. of sand, or ½-in. of mortar.
Cincinnati	Either sand or mortar 1 in in thickness made of 1 part of Portland cement and 3 parts of sand.
Philadelphia	Mortar, 1 part Portland cement and 4 parts sand, not less than 1 in. thick.
Minneapolis	1 in. of sand.
St. Louis	1 in. of sand.

Joint Filler

The Association	Suitable bitumen, or, when the blocks are laid upon a mortar or a bituminous cushion, sand.
The Society	Sand.
Borough of Manhattan.	Sand
Chicago	Asphaltic pitch, cement grout, or sand.
Cincinnati	Sand.
Philadelphia	Sand.
Minneapolis	Pitch.
St. Louis	Sand.

Expansion Joints

The Association	Not less than ¾-in. along the curb, filled with a suitable bituminous substance.
The Society	¾-in. along the curb, filled with a suitable bituminous substance; on streets 50 ft. or more in width a second expansion joint similar to the other, separated from the first by a row of blocks; on heavy traffic streets, if deemed advisable by the engineer, expansion joints can be omitted.
Borough of Manhattan.	None.
Chicago	1½ ins. along the curb, filled with a bituminous substance.
Cincinnati	Similar to the Society's requirements.
Philadelphia	¾-in. along the curb, filled with a bituminous substance.
Minneapolis	1 in. along the curb, filled with pitch.
St. Louis	1 in. along the curb and at intervals of about 100 ft. across the street at direction of street commissioner, to be filled with a mixture of bituminous material and hard mineral dust.

Since the introduction of treated wood as a paving material it has increased in popularity very rapidly. It was seriously handicapped by the experience of the cities in the past, but, when the officials realized that by chemical treatment the wood would be preserved from decay, it soon came into general use. It has so many good qualities, the chief one being possibly its almost complete noiselessness, and its principal, and perhaps its only bad quality being its slipperiness, that property owners were quick to appreciate it despite its increase in cost over asphalt and other smooth pavements. The slipperiness of wood is experienced only when the surface of the pavement is frosty or damp, or when the grades are excessive. The former trouble exists only in a comparatively few days of the year, and can in a great measure be obviated by proper sanding; the latter can be prevented by judicious action in laying the pavement. The author's practice has been not to lay wood blocks on a continuous traffic street on grades of over 2 per cent.

In considering this question of slipperiness, however, it should be noted that Minneapolis, Minn., which has probably the largest amount of creosoted wood pavement in the country, reports that it has had no trouble whatever from slipperiness, and the city of Great Falls, Mont., also makes the same report. This is exceedingly interesting, when from other cities have come the most positive statements regarding the slippery properties of the pavement. Both of these cities, however, are situated far from the sea coast and it is possible that the lack of normal moisture in the atmosphere would account for it. The most of the pavements laid in Minneapolis are of Norway pine and tamarack, while those of Great Falls are of tamarack, so that the material may possibly account for the difference.

The popularity of wood as a paving material is illustrated by its present use. The city of New York alone awarded in 1912 contracts amounting to 320,000 sq. yds., while the amount laid in the United States previous to Dec. 31, 1911, was 5,670,000 sq. yds., and it was estimated that from two to two and one-half million sq. yds. would be laid in 1912. The cost of this pavement varies according to local conditions and specifications, but it averages from $3.25 to $3.50 per sq. yd., the blocks being 4 ins. deep, laid on a foundation of Portland cement concrete 6 ins. thick.

Repairs

Very little information can be obtained of the cost of repairs to or maintenance of creosoted wood pavements, because these pavements have practically all been laid under a guarantee by which the contractor is obliged to keep them in repair for five years without extra cost, and also because, after the pavements are out of guarantee, although the repairs are made by the employees of the highway departments, still no exact record of costs has been kept in most cases. The pavement on Tremont St., Boston, referred to earlier in this paper, has been in use twelve years and has cost absolutely nothing for repairs, and it is stated by the engineer in charge of the Boston pavements that the same is true of some other 14,000 sq. yds. which were laid at about the same time and in the same way. In the Borough of Brooklyn, New York City, the first creosoted wood pavement was laid in 1902, without any guarantee, and has cost absolutely nothing for repairs. Pavements that were laid later and have been out of guarantee from three to four years have been kept in repair by the borough and an accurate record kept of their cost. Some of the streets have cost absolutely nothing, and the average cost for the entire area out of guarantee has been 1.05 cts. per yd. per year. Many of these pavements, however, have been opened for subsurface work, and the engineer in charge of pavements states that in his opinion practically all of the repairs are due to settlements over trenches, and damage caused by fires, and not to actual wear and tear of traffic. The Borough of Manhattan, New York City, has three streets which have been out of guarantee three years, one of heavy traffic, one of medium traffic and one of light traffic. The heavy traffic street has cost 7 cts. per yd. per year, while the average of all has been 6 cts. per yd. per year; but it should be explained here, as in the case of the Brooklyn streets, that the repairs have been due to wear and tear only on the heavy traffic street, which is a wholesale street in the business section. Repairs on the other streets are due to settlements over trenches, damage caused by fire, and practically nothing to wear and tear of traffic.

The City of Minneapolis, Minn., has 1,000,000 sq. yds. of wood block pavement, the first of which was laid in 1902. The greater part of the material is Norway pine and tamarack. The city engineer states that this pavement has required practically no repairs, the cost of same in 1911 being less than 0.1 ct. per sq. yd. He also states that the street paved in 1902 is in good condition, and looks as if it might last for ten years longer.

In St. Louis in 1909 the repairs to 50,000 sq. yds. of wood pavement laid in 1903 cost $2.10, and in 1911 these same 50,000 sq. yds. cost less than 0.2 ct. per yd., so that the total cost of repairing the 50,000 yards of wood pavement the first nine years they were laid was 0.2 ct. per yd. These pavements are all on light traffic streets.

Cleaning

No definite information seems to be available as regards the relative cost of cleaning wood and asphalt pavements. In 1907, however, a commission was appointed by the mayor of the City of New York to investigate the entire matter of street cleaning. The following is quoted from the report of this commission:

> There is a very marked difference between the quantity of dust left upon the pavements of various kinds. Thus, if we call the average volume and weight collected from the sheet asphalt pavement 100, the relative quantities from other kinds of pavements were:

	Volume.	Weight.
From sheet asphalt	100	100
From block asphalt	130	182
From wood block*	332	145
From granite block	1,081	912

> After careful consideration of all the facts available, we estimate the average relative cost of cleaning, equally well, the various kinds of pavement in use in the city under similar conditions of repair, as follows:

Sheet asphalt pavement	100
Wood block pavement (new)	105
Asphalt block pavement	115
Brick pavement	120
Wood block pavement (old)	125
Medina block pavement	130
Granite block pavement	140
Belgian block pavement	150
Cobblestone pavement	3,000

> On the assumption of 100 cleanings per year it may be shown that the annual cost of cleaning equally well a mile of each of the pavements named, over what it would be if sheet asphalt were substituted, would be as follows:

Wood block pavement (new)	$26.40
Asphalt block pavement (average condition)	79.20
Brick pavement	105.60
Wood block pavement (old)	132.60
Medina block pavement	158.40
Granite block pavement	211.20
Belgian block pavement	264.00
Cobblestone pavement	1,584.00

> *It should be said that the wood block pavement on which the examination was made is one of the oldest of its kind in the city, and its surface, being uneven, caught and held an unusual quantity of dust. Wood block pavement, when comparatively new, should compare favorably with asphalt block pavement in its freedom from dust retaining qualities.

A local newspaper at Casablanca, Morocco, has organized an automobile tour for the purpose of encouraging the construction of good roads, according to a note in a recent issue of the "Daily Consular and Trade Reports." The route passes through several cities, each of which is to give a prize. It is stated that there are now no good roads in the country and that most of the travel is by caravan with camels and mules.

According to a report on the street requirements of the city submitted by Public Service Director W. J. Springborn of Cleveland, O., there are 601 streets in need of repair. The amount of money required to defray the cost is estimated at about $4,250,000. Nearly half of the total cost will be borne by property owners in case the improvements are made.

The provincial government of Prince Edwards Island has issued a statement to the effect that automobiling will be permitted on the island three days each week—Monday, Wednesday and Thursday. Up to the present time the roads of the island have been closed to motor vehicles.

Brick Paved Roads in Cuyahoga County, Ohio

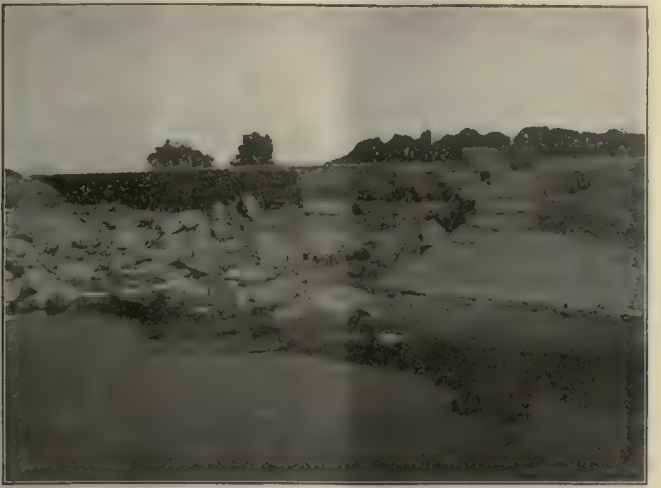
Brick for the paving of both city streets and country highways has for some years found very extensive use in the city of Cleveland, Ohio, and in Cuyahoga County, of which the city is the county seat. Many miles of roads radiating from Cleveland into the surrounding country have been paved with this material, and as a result the attention of engineers interested in paving problems has been directed to that section of the country.

In a recent address to a class in engineering at the Ohio State University, County Engineer Frank R. Lander, under whose direction the work has been done, outlined to the students the experience of the county officials in improving the highways. Before the advent of the automobile, water bound limestone macadam was the form of construction most favored in the county. This type of road was decided upon after a careful investigation of the subject of stone roads in general and a special study of local conditions on all proposed work. The county officials made a careful selection of materials, adopted what were believed to be the most approved methods of construction and then, with the cooperation of the contractors doing the work, built many miles of road of this kind. These roads, it was found, did not meet the demands of modern traffic, and, according to County Engineer Lander, all of them had to be replaced by a more permanent improvement even before the abutting owners had finished paying assessments for their proportion of the cost of the work.

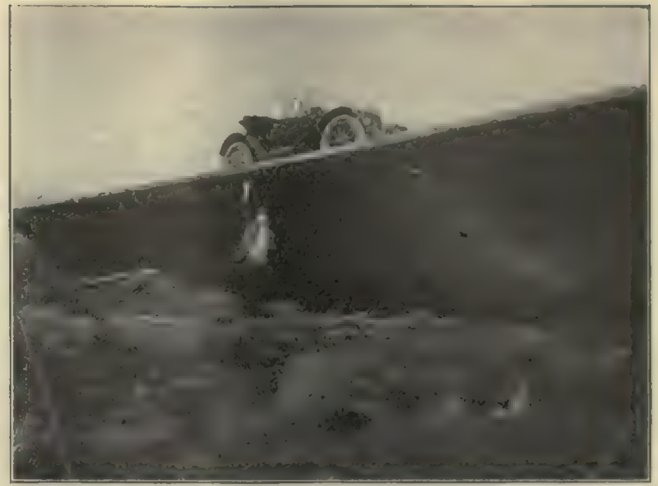
BRECKSVILLE ROAD, CUYAHOGA COUNTY, OHIO—BRICK PAVEMENT LAID IN 1906; PHOTOGRAPH TAKEN LAST YEAR.

When the road officials of the county were again confronted with the necessity for deciding upon materials and methods of construction, the employment of which would produce roadways of the type demanded by the traffic, further investigations were made. The result of these was that after a careful study of the traffic conditions in the county, experiments with various types of pavements and observations of experiments conducted by the city of Cleveland and smaller cities, a brick surface on a concrete foundation was decided upon as the most suitable form of construction. The brick paved roads are reported to have given satasfaction and to have cost very little for maintenance.

Two of the accompanying illustrations show typical brick paved roads in Cuyahoga County. The large illustration at the bottom of the next page shows a portion of the Mayfield Road. The road is on a steep hill and was paved for a width



WASHOUT UNDER BRICK PAVEMENT ON DUNHAM ROAD NEAR CLEVELAND, OHIO—PAVEMENT INTACT AND BEARING AUTOMOBILE.



NEAR VIEW OF CEMENT GROUTED PAVEMENT SHOWN IN THE ILLUSTRATION OPPOSITE—UNSUPPORTED AREA ABOUT 80 FT. LONG AND 7 FT. WIDE.

of 16 feet with "hillside" brick in 1911. The curbs and gutters are of concrete, of the combined type. The photograph from which the illustration was made was taken in 1911.

The small illustration on the preceding page shows a form of construction employed extensively in Cuyahoga County and elsewhere in Ohio—a brick paved roadway with an earth road at the side. This is a portion of the Brecksville Road which was laid in 1906. The brick pavement is 14 ft. wide and rests on a broken stone base. Stone curbs were laid and the joints were filled with cement grout. The photograph from which the illustration was made was taken in 1912.

The two illustrations at the top of the page show what strength is sometimes obtained by cement grouted brick pavements. The road shown is the Dunham Road, which was badly washed out by a recent freshet in Tinker's Creek, south of the city of Cleveland. The road was paved for a width of 14 ft. with brick on a 4-in. concrete foundation. The washout carried away the concrete retaining wall, part of which may be seen in the foreground, and on a portion of the road—to the left in the illustration—also carried away the concrete foundation under about half of the width of the pavement, leaving the brick in place but entirely unsupported from beneath over an area about 80 ft. long and 7 ft. wide. Although barriers and warning signs were erected immediately, considerable traffic went over the pavement. Both illustrations show a runabout on the overhanging portion of the brick roadway. The penetration of the grouting into the joints may also be seen along the edge of the pavement in the right hand illustration.

It is stated that although at first it was planned to repair the damaged road by breaking down the paving and building up an entire new road it has finally been decided to build a road nearly to the brick and place the concrete foundation between the top of the fill and the bottom of the pavement.

MAYFIELD ROAD, CUYAHOGA COUNTY, OHIO—STEEP HILL PAVED WITH BRICK "HILLSIDE" BLOCKS—CONCRETE COMBINED CURB AND GUTTER.

The Bridges of Chicago

By H. G. TYRRELL

Rising in a little more than half a century from a village on the lake shore, Chicago is now the fifth largest city in the world. This wonderful growth has been possible only because of the city's advantageous position on the lake, with its river harbor and facilities for shipping by both rail and water. Its location, together with the enterprise and good management of its shrewd pioneers and their descendants, has made it possible for Chicago's citizens to be justly satisfied with their city's achievements. And yet, it was plainly impossible for a city of 2,000,000 people to arise in so short a time, with public works and utilities equal in beauty to those in European capitals such as Paris or Berlin, which have been developing for many centuries.

Few features of any city influence its appearance more than its bridges, for they are generally easily seen from a distance up and down the river and are necessarily conspicuous. And the very fact of their prominence is the city's opportunity, making possible the erection of beautiful structures which can be seen and admired, while public buildings, like the Chicago city hall and post office, are often so surrounded by other buildings that their cost and merit can hardly be appreciated.

STEEL ARCH BRIDGE OVER LAGOON IN LINCOLN PARK, CHICAGO, ILL.

In order to better understand some of the requirements of Chicago's bridges, reference must be made to the amount of shipping on the river. Five years ago this shipping comprised receipts of 8,564,000 tons and shipments of 2,846,000 tons, or a total of 11,410,000 tons. Of the receipts, coal and ore formed 80 per cent., with only 20 per cent. of all other goods; while grain constituted more than 70 per cent. of all the outward shipments. These amounts are about three times greater than all the shipping at Paris. The volume of water shipping can better be appreciated when it is considered that a large lake boat of from 10,000 to 20,000 tons can carry as much as twenty average trains.

In order to accommodate this heavy river traffic, bridges over the river must be opened from 30 to 40 times a day during about eight months of navigation, those nearest the river mouth, from Rush St. up to Wells St., being the most active. The old swing back of the Wells St. depot, which is now demolished, for a time previous to its renewal was opened from 80 to 100 times per day to accommodate the heavy suburban service and local switching. These bridge movements are very large when compared to those of the Tower Bridge at London, which rarely opens more than 20 times per day, though they are exceeded by some bridges at Milwaukee, near the river mouth, such as that at Broadway, which in 1904 was opened on an average of 150 times per day.

BASCULE BRIDGE ON NORTH HALSTED STREET, CHICAGO, ILL.—SCHERZER TYPE.

No other city in America maintains so heavy travel on both land and water as does Chicago. The four-track Metropolitan bridge near Van Buren St. carries 1,200 trains daily, but it has enough under clearance so that the openings do not average more than 30 per day. Natural conditions at Chicago are much the same as at Paris and Berlin, where the land is also low and great height beneath the bridges is not obtainable. The number of openings is usually inversely proportional to the height of the bridge above the water, the higher ones having the fewest movements. The clearance under bridges in Chicago is indeed small in comparison to that at some other cities, as is shown by the following table:

MADISON ST. SWING BRIDGE, CHICAGO, ILL.—TO BE REPLACED BY BASCULE BRIDGE.

City	Under Clearance
Chicago	16.5 ft.
New York (Harlem River)	24.0 "
Boston (Charles River)	23.0 "
London, Tower bridge	29.5 "

Chicago now has not less than 60 movable bridges, of which 50 or more carry streets; two carry both streets and

BASCULE BRIDGE ON ERIE ST., CHICAGO, ILL.—STROBEL TYPE.

SWING BRIDGE ON WEBSTER AVE., LATELY REMOVED—FORMERLY THE PREVAILING TYPE.

railway, and eight or more carry railways only. These have all been built in less than 80 years. The first crossing of any kind of the Chicago River was by ferry at Lake St. in 1829, and four years later a rough log bridge, which continued in use for seven years, was built at Randolph St. The first bridge over the North Branch was a floating one at Kinzie St., built in 1832, and two years later the first movable bridge in Chicago was built at Dearborn St. After that time, some fine wooden swings were erected, at least seven of which were burned in the fire of 1871.

Few people realize the amount of money that the city is about to spend, or is actually spending, on new bridges. This amounts, altogether, to over $5,000,000. The bridges now ordered for construction include those shown in the table at the top of the page. This list does not include those now under construction, such as those at Washington St., 92nd St. and Chicago Ave. Those at 92nd St. and Chicago Ave. were let by contract at the following prices:

	Chicago Ave.	92nd St.
Foundations	$105,346	$114,400
Superstructure	154,500	155,650

The bridge at Rush St., designs for which have so often been presented, is now planned with lower and upper decks, 60 and 90 ft. wide respectively, with a span of 220 ft. In January of this year $6,000 was appropriated by the city for making the plans, after the general approval of the project by the War Department a month or two before. One-half of the cost of the Twelfth St. bridge is to be paid by the Sanitary District.

Of the bridges shown in the table, those at Rush, Twelfth, Lake, Madison, Wood and Fuller Sts., Webster and Belmont Aves. and Irving Park Blvd. are to be of the double leaf bascule type. The types to be used for the remaining bridges are somewhat uncertain, though the policy of the city is to build bascule bridges at all crossings of navigable streams.

RUSH STREET BRIDGE, CHICAGO, ILL.—TO BE REPLACED BY BASCULE BRIDGE.

The bridges under construction at Washington and 92d Sts. and Chicago Ave. are of the double leaf bascule type.

BRIDGES ORDERED FOR CONSTRUCTION.

Bridge.	Cost.
Rush Street	$750,000
Twelfth Street	480,000
Lake Street	430,000
Madison Street	330,000
Webster Avenue	250,000
Belmont Avenue	250,000
106th Street	250,000
South California Avenue	200,000
Wood Street	175,000
Fuller Street	175,000
Irving Park Boulevard	68,000
North Central Park Avenue	19,000
North 40th Avenue	9,000
North 48th Avenue	9,000
	$3,395,000

Such opportunity for aesthetic development along the river was probably never offered before and it is greatly to be hoped that those in charge of bridge construction will take advantage of every possible opportunity to build structures which are not only commodious, but beautiful enough to be worth preserving. Up to the present the chief thought has been given to making bridge machines which will work quickly, easily and well, and in this respect there is little left to be desired, as is proven by the enormous daily traffic which the city's bridges carry.

The Use of Bitulithic Pavement in New York State Road Work

The 1913 highway law of New York State provides for the use of patented pavements by the following clause: "In the construction, maintenance or repair of state or county highways, no patented material or article or any other material or article shall be specified, contracted for or purchased except under such circumstances that there can be fair and reasonable opportunity for competition, the conditions to secure which shall be prescribed by the Commissioner of Highways."

In order to set forth a clear statement of the interpretation placed by the State Highway Department upon this clause in reference to bitulithic pavement, State Highway Commissioner John N. Carlisle on July 22 adopted rules and regulations for its use. According to the ruling made by the Commissioner, the principal requirement imposed upon the patentees, Warren Bros. Co., of Boston, Mass., is as follows:

"Upon the Commissioner of Highways determining that any pavement in any city or village on any county or state highway in the State of New York shall be constructed of bitulithic pavement, the owners of said patent, within five days thereafter, shall file with the State Highway Department at their office in the city of Albany, N. Y., a price at which they will deliver said material to contractors in connection with said work to be constructed or improved. Said price to be available for any contractor desiring to bid upon said work and the provisions of the offer of said company to be approved by the State Department of Highways."

Petitions have been made by the villages of Lowville, Oriskany Falls and Ilion and the cities of Johnstown, Rome and Whitesboro for the laying of bitulithic pavement on state highways running through their areas.

The Cuban Congress has voted the sum of $300,000, to be issued in two equal amounts, one in the season of 1913-14, and the other in the season of 1914-15, for the construction of a road between Cidra and Bolondron, Province of Matanzas. In addition to this the sum of $125,000 is asked for building roads in the same province, between Sabanilla and Ecomendador, between Bolondron and Alacranes, and from Cabezas to Cuatro Caminos. A presidential decree has also been signed authorizing bids for extending the Malecon, a driveway in Havana, for which Congress voted $1,000,000 some months ago.

AMERICAN ROAD BUILDERS' ASSOCIATION

150 NASSAU STREET
NEW YORK, N. Y.

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Through the courtesy of the publisher of "Good Roads," this page, each month, is devoted to the use of the American Road Builders' Association. It is solely in the interests of the Association, and it is the desire of the Executive Committee that all members feel that this space is their own, and that they contribute freely to it, not only as regards anything concerning the Association itself, but also that which will further the good roads movement. Besides the official announcements of the Association, there will appear on the page contributions by members, items of news concerning the Association activities and personal notes about its members. All contributions should be sent to the headquarters of the Association at 150 Nassau Street, New York, N. Y.

Executive Committee:
Geo. W. Tillson
R. A. Meeker
E. L. Powers

A. R. B. A. Badge

The official badge of the A. R. B. A., which is reproduced in black and white at the top of this page, can now be secured from the Secretary of the Association at 150 Nassau Street, New York, N. Y.

The badge is of solid gold, with white and blue enamel. The ground work of the center is blue enamel with the monogram in gold. The outer portion of the badge is of white enamel with the lettering in gold, with a gold rim surrounding the whole.

The badge is ⅝ in. in diameter, and may be obtained as a button, clasp pin, scarf pin or watch charm for $1.38. As cuff links the price is $2.76.

The Philadelphia Convention

Although it is still early, present indications are that the Tenth Annual Convention, Fourth American Good Roads Congress and Fifth Annual Good Roads Exhibition, which the A. R. B. A. will hold at the First Regiment Armory, Broad and Callowhill Sts., Philadelphia, Pa., on Dec. 9, 10, 11 and 12, will surpass even the previous successful gatherings of the Association.

The convention committee, which has the management of the affair in its charge, has been busily engaged in the making of the preliminary arrangements and is now rapidly getting various matters of detail arranged. A tentative outline of the program has been made and is now being considered by the committee and the Association's staff of officers.

Applications for exhibition space already received point to the hearty cooperation of manufacturers and dealers and it is evident that the display of machinery and materials for road and street construction and maintenance is going to be bigger and better than ever. The convention committee is now at work on the plan of the exhibition hall, where over 20,000 sq. ft. of floor space is available, and the allotment of space will begin in a few days.

It is planned to conduct the meeting in accordance with the same general plans that have yielded such gratifying results in the past, but several new features are contemplated. Every effort is being made by the convention committee, and between now and the opening of the convention it is expected that plans will have been perfected for making the meeting the most important and influential gathering of its kind ever held.

Dinner Given by President Hill

During the week of the Third International Road Congress Samuel Hill, President of the A. R. B. A., gave a dinner at the Hotel Metropole, London, to delegates from the United States and others. Among the guests was Lord Strathcona, the former Governor General of Canada and one of the best known men in the British Empire.

The dinner was given at 7.30 p. m. on Tuesday, June 26, and was attended by 25 guests. An especially pleasant feature of the entertainment was furnished by bagpipers. During the dinner they marched into the room and made several circuits of the tables while playing their characteristic instruments. Although the dinner was entirely informal, several impromptu speeches were made, among the speakers being Lord Strathcona, who, despite his 95 years, joined heartily in the evening's festivities. In the course of his remarks he recounted some of the experiences of his long public life and expressed the pleasure it gave him to be present and meet President Hill's guests. He was nominated an honorary member of the Association by the members present.

The menu follows:

Grape Fruit
Petite Marmite
Blanchaille Francaise
Selle d'Agneau de Lait
Petite Pois
Haricot Verts
Sandwiches Samuel
Peches Canadiennes
Fromage
Cafe Noir

Besides President Hill and Lord Strathcona, those present were: W. A. Bell, Prof. A. H. Blanchard, H. J. Bowman, H. S. Carpenter, C. P. Chamberlin, S. D. Charles, S. R. Church, J. H. Cook, Maj. W. W. Crosby, The Hon. Charles Develin, Peter Gillespie, D. B. Goodsell, Dr. A. O. Hastings, A. N. Johnson, C. A. Kenyon, Phillip Kitchin, A. T. Laing, W. A. McLean, Col. Geo. A. Nelson, E. L. Powers, Clifford Richardson, F. P. Smith, E. H. Thomes and W. G. Trethewey.

State Engineer Geo. W. Cooley

In a list of the members who were expected to represent the A. R. B. A. at the Third International Road Congress, printed in the issue of June 7, Geo. W. Cooley was referred to as "former State Engineer of Minnesota." The insertion of the word "former" was due to an error in proof reading, which we regret. Mr. Cooley is still rendering the State of Minnesota efficient service as Secretary of the State Highway Commission and State Engineer.

Notes

At a recent meeting of the A. R. B. A. board of directors the Executive Committee was authorized to memorialize the Congress of the United States to provide for the official representation of this country at the next international road congress at Munich in 1916 and in the Permanent International Association of Road Congresses.

Arthur H. Blanchard, M. Am. Soc. C. E., Professor of Highway Engineering at Columbia University, has returned from Europe, where he attended the Third International Road Congress as a delagate of the A. R. B. A. and other organizations. After the adjournment of the congress Professor Blanchard spent some time investigating various roads and pavements in England, France and Germany.

Clifford Richardson, of New York, N. Y., who was one of the representatives of the A. R. B. A., at the Third International Road Congress at London last June, is at present touring in Europe. He is expected to return late this month.

Geo. W. Tillson, Consulting Engineer to the President of the Borough of Brooklyn, New York, N. Y., and Third Vice President of the A. R. B. A., who was one of the representatives of the Association at the Third International Road Congress at London in June, started soon after the close of the congress for a trip on the Continent.

James H. MacDonald, former State Highway Commissioner of Connecticut and a Past President of the A. R. B. A., has opened offices in the Chamber of Commerce building, New Haven, Conn. Mr. MacDonald, who served the state of Connecticut as Highway Commissioner for about seventeen years and is well known in road building circles throughout the country, will engage in consulting highway engineering.

DINNER GIVEN BY PRESIDENT SAMUEL HILL AT THE HOTEL METROPOLE, LONDON, ENGLAND, ON JUNE 26, DURING THE THIRD INTERNATIONAL ROAD CONGRESS.

W. S. Keller, of Montgomery, Ala., State Highway Engineer of Alabama, was elected a member of the American Society of Civil Engineers on July 2.

J. J. Murphy, Civil Engineer to the Commissioner of Parks and Boulevards, Detroit, Mich., was elected an associate member of the American Society of Civil Engineers on July 2.

The first lot of the official A. R. B. A. badges, which are described elsewhere, were received in time to be worn by members at the Third International Road Congress at London. Many have already purchased badges and all have expressed themselves pleased with the design.

James H. Sturdevant, who for the past few months has been serving as Acting Second Deputy, in charge of maintenance and repairs, New York State Commission of Highways, has been transferred to the position of Division Engineer in the department.

E. L. Powers, Editor of "Good Roads," and Major W. W. Crosby, Chief Engineer of the Maryland Geological Survey, Secretary and Treasurer, respectively, of the A. R. B. A., who were among the representatives of the Association at the Third International Road Congress at London, visited Paris on their way home. While there Messrs. Powers and Crosby, with S. R. Church, Manager of the Research Department of the Barrett Mfg. Co., New York, N. Y., and E. H. Thomes, Assistant Engineer, Bureau of Highways, Borough of Queens, New York, N. Y., A. R. B. A. members, visited the city wood block plant. In this plant the entire process of manufacture is carried out, the factory receiving timber and turning out treated paving blocks. The inspection was made under the guidance of Jean de Pulligny, Chief Engineer of Roads and Bridges of France. Mr. Pulligny was the Director of the French Mission of Engineers to the United States, and while here in the interests of his government was a speaker at the convention of the American Road Builders' Association at Cincinnati last year and at various other meetings.

NEWS OF THE ASSOCIATIONS

Chattanooga-Athens-Knoxville Highway Association

The building of a concrete road from Chattanooga to Knoxville, Tenn., a distance of about 120 miles, is being promoted by the Chattanooga-Athens-Knoxville Highway Association and the commercial organizations of Chattanooga, Knoxville and other Tennessee cities through which the proposed road is to pass.

At the instance of the Chattanooga "Times," the Junior Chamber of Commerce of that city, the Chattanooga Chamber of Commerce and the Knoxville Board of Commerce, a good roads meeting was held at Athens, a city about half way between Chattanooga and Knoxville, on July 4. A large number attended and addresses were made by many prominent men of the state, including T. Asbury Wright, of Knoxville, President of the National Conservation Exposition, and C. C. Gilbert, of Nashville, a member of the Tennessee Legislature and President of the Memphis-Bristol Highway Association. At the meeting a temporary organization of the Chattanooga-Athens-Knoxville Highway Association was effected with the following officers: President, S. H. Thompson, Athens; Vice President, J. Wylie Brownlee, Knoxville; Secretary and Treasurer, V. D. L. Robinson, Chattanooga. The chairman of the executive committee is T. R. Preston, of Chattanooga. It was decided to call a convention at Chattanooga in the near future to form a permanent organization.

The proposed highway, if built, will connect at Knoxville with the road from Memphis to Bristol, which is now under construction, and with several other through roads which are planned. Among these are a road from Chattanooga to Rockwood; one from Chattanooga to Birmingham, Ala.; one from Chattanooga to Atlanta, Ga., and one from Chattanooga to Louisville, Ky.

Considerable progress has already been made in the building of good roads in the vicinity of Chattanooga. An account of the work of the Hamilton County Road Commission was printed in the issue of May 3 ["Paving Work in Hamilton County, Tennessee," "Good Roads," May 3, 1913, p. 258], and a short account of the building of the road to Signal Mountain was printed in March ["New Mountain Road near Chattanooga, Tennessee," "Good Roads," March 1, 1913, p. 155].

Horseshoe Competition of the Roads Improvement Association of England

In order to stimulate the invention of a horseshoe which will provide horses with a satisfactory footing upon improved waterproof roads and, at the same time, will damage the roads as little as possible, the Roads Improvement Association, Incorporated, of England, has offered a prize of £100 to the inventor of such a shoe.

In the official circular setting forth the terms of the competition, attention is called to the necessity of maintaining the surfaces of bitumen bound roads intact in order to prevent the entrance of water into the body of the road and the consequent disintegration of the pavement. It is also pointed out that complaints from drivers are often made to the effect that horses cannot obtain a foothold on pavements of this kind and to statements from engineers that the calks and other similar devices used on horses' shoes tend to tear up the roads.

The competing devices will be judged upon their merits as meeting the two principal requirements—providing a foothold for horses and inflicting the minimum of damage upon the road—and upon their general practicability, including the capability of their general manufacture, reasonable length of life, moderate cost, and similar considerations.

Entries must be made on official forms which can be obtained from Wallace E. Riche, Secretary of the Roads Improvement Association, Incorporated, 15 Dartmouth St., Westminster, London, S. W. A separate entry form must be filed for each shoe submitted and each entry must be accompanied by a specimen shoe or shoes and a brief memorandum of the general features of the device and its claims. The competition closes Dec. 31, 1913, and no formal entries, with accompanying shoes and memoranda, should be sent before Dec. 1, 1913. The judges reserve the power to withhold the award provided no shoe entered is deemed worthy of a prize and also to divide or add to the prize if two or more shoes are considered equally meritorious.

The judges' committee consists of Robert Todd, Chairman, Chairman of the Roads Improvement Association; H. Percy Boulnois, M. Inst. C. E., and Col. R. E. Crompton, C. B., M. Inst., C. E., Vice Chairmen of the Roads Improvement Association; E. G. Fairholme, Chief Secretary of the Royal Society for the Prevention of Cruelty to Animals; J. H. Horton, J. P.; W. Hunting, F. R. C. V. S., Past President and Examiner, Royal College of Veterinary Surgeons; Alan Lupton; Col. C. E. Nuthall, Assistant Director of Veterinary Services, Eastern Command and London District; Henry J. Selby, President of the United Horse Owners' and Allied Trades Protection Society; F. W. Stanley, M. R. C. V. S., Member of the Council of the Incorporated National Union of Horse and Vehicle Owners and member of the Council of the Roads Improvement Association, Incorporated; Richard S. Tilling and Thomas Wolsey, M. R. C. V. S., Chairman and Director respectively, Thomas Tilling, Ltd., and Wallace E. Riche, General Secretary of the Roads Improvement Association, Incorporated.

Colorado-to-the-Gulf Highway Association

A great stimulation of public interest in road improvement in the states of Texas, New Mexico and Colorado has resulted from the formation of the Colorado-to-the-Gulf Highway Association, according to a report to "Good Roads" from Secretary A. W. Read, of Memphis, Tex.

This association was organized at two meetings held at Childress, Tex., the first late in May and the second on June 5, as reported in this journal for June 7. Its object is to arouse sentiment for road improvement in the Texas Panhandle and the adjoining portions of New Mexico and Colorado, with the especial purpose of building a trunk highway from Denver, Colo., to Galveston, Tex. It is the contention of the promoters that the projected road will provide a direct route to the summer resorts of Colorado for residents of Texas and adjacent states, and also furnish a good road for northern tourists between the mountains of Colorado and the Texas coast.

President O. L. Williams, of Bowie, Tex., and Secretary A. W. Read, of Memphis, Tex., recently made a trip over the line of the proposed road and reported on their return that there were highways all along the route that could be so improved as to make a first-class trunk road and that the work could be done at little expense. During their trip the officials formed county organizations which have been pledged to keep the road in condition, and as a result of the association's activity several lateral roads have been planned to connect with the main highway.

Lincoln Highway Association

The organization formed for the building of a transcontinental road by subscription from automobile manufacturers and formerly known as the Coast to Coast Rock Highway Association has been incorporated under the laws of Michigan as the Lincoln Highway Association. The objects of the organization are unchanged, the new name having been adopted, as noted in "Good Roads" of June 28, in order to make the proposed road a memorial to Abraham Lincoln.

Officers have been elected as follows: President, Henry B. Joy, Detroit, Mich.; Vice Presidents, Carl G. Fisher, Indianapolis, Ind., and A. R. Pardington, New York, N. Y.; Treasurer, Emory W. Clark, Detroit, Mich., and Secretary, A. R. Pardington, New York, N. Y. The executive committee and board of directors include the officers named and Paul H. Deming and A. Y. Gowen, Cleveland, O., Russell A. Alger and Roy D. Chapin, Detroit, Mich., and F. A. Seiberling, Akron, O. The headquarters of the association are in the Dime Bank building, Detroit.

National Highways Association

On July 26 A. L. Westgard, Vice President of the National Highways Association, arrived at San Francisco after crossing the continent by automobile in the interests of his association.

The object of Mr. Westgard's trip is to collect data on roads, which will be used by the National Highways Association in its campaign for national road building. The trip completed by Mr. Westgard was 4,500 miles in length. Leaving New York on June 2, he went through Philadelphia, Washington, D. C., Pittsburgh, Wheeling, Columbus, Cleveland and Toledo, to Chicago, where he joined the tourists of the Lincoln Highway Association for the remainder of the trip westward.

Vice President Westgard expects to reach New York some time in December, after having made an examination of a route from Portland to Salt Lake City through Walla Walla, Spokane, Coeur d'Alene, Boise and Ogden.

MEETINGS

Midsummer Congress of the Texas Good Roads Association

The Midsummer Congress of the Texas Good Roads Association was held at Corpus Christi, Tex., July 10, 11 and 12, and was attended by a large number of delegates from various parts of the state.

The congress was presided over by John W. Warren of San Antonio, President of the Texas Good Roads Association. Acting Mayor Hugh Sutherland of Corpus Christi welcomed the delegates at the opening session, and response in behalf of the delegates was made by Homer D. Wade, Secretary of the Texas Good Roads Association.

Other addresses and talks were as follows: President's address, John W. Warren; address, "Relation of Good Roads to Public Education," T. H. Shelly, Chief Clerk, State Department of Education; talk on the construction of shell roads, J. M. Howe of Houston, Highway Engineer of Harris County; talk on sand-clay and gravel road construction, George D. Marshall, Highway Engineer of Bexar County; talk on the use of the split log drag, W. E. Hall of McLennan County; address, "Federal Aid for Highways," Col. Dell M. Potter of Clifton, Ariz., President of the Southern National Highways Association; address, "Business Phases of Road Improvement Contracts," Ferrell Bartlett; address, "Road Administration and Road Improvement," Julian Feild of Denison; address, "General Highway Construction and Maintenance," J. F. Witt of Dallas; talk on good roads, Prof. J. C. Nagle, Dean of the State Agricultural and Mechanical College.

In addition to the above, remarks were made at the closing session by several members of the State Federation of Women's Clubs.

Following the close of the regular proceedings at each afternoon session a class in road building was conducted by Prof. Robert J. Potts of the State Agricultural and Mechanical College. Among those who addressed the delegates at these classes were J. F. Witt of Dallas, George D. Marshall of San Antonio, William Bradburn of Houston, Terrell Bartlett of San Antonio, J. Milton Howe of Houston, Julian C. Feild of Denison, John B. Hawley of Fort Worth, J. C. Travilla of Fort Worth, Dr. L. I. Hewes of Washington, D. C., D. E. Colp of San Antonio, Prof. J. C. Nagle, and others.

President John W. Warren was instructed to appoint a Vice President of the Texas Good Roads Association for each county in the state.

Resolutions were adopted favoring the construction of rural roads leading from farms to towns and of trunk roads from town to town and city to city; advocating the enactment of legislation providing for a state highway department; recommending that the present method of condemning property for highway purposes be changed so that the property could be taken upon an award by a jury and deposit of the damages with the county treasurer, subject to the order of the owner of the property; recommending the enactment of legislation authorizing two or more counties to purchase and use road machinery jointly when desirable, and recommending the formation of road associations in various communities.

It is planned to hold the next meeting of the association at Dallas on "good roads day" at the State Fair, during the coming fall.

Good Roads Day at the Institute of the Texas Commercial Secretaries' Association

The second day's sessions of the institute of the Texas Commercial Secretaries and Business Men's Association, held at Mineral Wells, July 15 to 19, were devoted to highway improvement. Homer D. Wade, Secretary of the Texas Good Roads Association, presided.

In opening the discussion, Secretary Wade called attention to the advantages of improved roads to Texas farmers, stating that 10,000,000 tons of farm produce were hauled to market every year in the state. The average haul is five miles, according to Mr. Wade, and the cost per ton per mile is 43 cts., making a total cost of $21,500,000. under present conditions. He said that over improved roads the cost per ton mile would be reduced to 23 cts., making a total saving of $10,000,000. It is Mr. Wade's opinion that one reason for the defeat of bond issues in Texas is lack of confidence in county officials and the road laws of the state.

Prof. R. J. Potts of the State Agricultural and Mechanical College spoke at length on highway legislation and financing. His address was divided into a number of subdivisions, among which were "Governmental Assistance in Material Development"; "The Bonding Laws"; "Proper Expenditure of Bond Money," "Maintenance" and "State and County Highway Department."

The association adopted the following resolutions:

"We believe that the question of improved public highways is one of vital importance to the development of Texas. This improvement is greatly handicapped by the present antiquated road laws. Therefore, be it resolved that we go on record as favoring a complete revision of these laws, even to an amendment of the constitution of Texas if necessary.

"Be it resolved further that we believe it necessary that in the expenditure of money for public roads it is imperative to get a full dollar's worth for a dollar, and to that end we recommend the establishment of a state highway commission, and we call upon Governor O. B. Colquitt to present the question to the special session of the 33d Legislature.

"Be it further resolved that the Secretary furnish the Governor with a copy of these resolutions."

Previously Reported

(Issues of July 12, 19 and 26.)

GUIN, ALA.—Promotion meeting, June 23. Page 31, July 12.

OZARK, MO.—Mass meeting, June 28. Page 31, July 12.

INTERMOUNTAIN GOOD ROADS ASSOCIATION.—Fourth annual convention, Boise, Idaho, June 10-12. Page 35, July 19.

OZARK TRAIL ASSOCIATION.—Organization meeting, Monte Ne, Ark., July11. Page 39, July 26.

RAPPAHANNOCK DISTRICT GOOD ROADS ASSOCIATION.—Organization meeting, Fredericksburg, Va. Page 40, July 26.

COLFAX, CAL.—Promotion meeting, July 13. Page 40, July 26.

NAYLOR, ARK.—Good Roads Rally, July11. Page 40, July 26.

SUMMITT AVE. BOULEVARD ASSOCIATION.—Organization meeting, St. Paul, Minn., July 11. Page 40, July 26.

COMING MEETINGS

August 11-13.—North Carolina League of Municipalities.—Annual meeting, Wrightsville Beach, N. C.

August 11-13.—Pacific Highway Association.—Fourth Annual Convention, Vancouver, B. C. Secretary, Frank M. Fretwell.

September 29-October 4.—American Road Congress.—Annual session, Detroit, Mich. Secretary J. E. Pennybacker, Colorado Building, Washington, D. C.

October 7-10.—American Society of Municipal Improvements.—20th Annual Meeting, Wilmington, Del. Secretary, A. Prescott Folwell, 15 Union Square, New York, N. Y.

November 10-15.—United States Good Roads Association.—Convention, St. Louis, Mo. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

December 9-12.—American Road Builders' Association.—10th Annual Convention, First Regiment Armory Bldg., Philadelphia, Pa. Secretary, E. L. Powers, 150 Nassau St., New York, N. Y.

February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

CORRESPONDENCE

THE ROAD DRAG IN KENTUCKY

Editor "Good Roads":

It has remained for a Kentuckian to demonstrate that the road problem is really no problem at all. It solves itself automatically by an application of horse power and horse sense.

The discoverer is a young farmer who got tired of sitting in the mud and waiting for friendly neighbors to come and pull him out. He also had decided opinions about the road working system in his locality. The progressive young farmer—one Will R. Marrs, by name—lived about a mile from a macadam road, on a miserable earth road through land that had never been cleared because it was too wet to cultivate. Mr. Marrs couldn't get to town in wet weather. One day he asked permission of the county to look after that stretch of road. All he did was to plow a good ditch on each side of the road and crown it for drainage. Then, at a cost of a couple of dollars he made a split log drag. Every time Mr. Marrs had occasion to send a team to town in bad weather he hitched the drag on behind the wagon and pulled it to the hard road. Returning, the drag was hooked on and pulled home—expense, nothing; result, the best mile of earth road in Henderson County, Kentucky.

The experiment is being repeated by other farmers, even including one who lives on the hard road. He made a drag and shod it with steel. He pulls the drag to town and back again occasionally, with no expense and no charge. A smooth road to travel is satisfaction enough, he says.

When one stops to think that there are about 2,000,000 miles of dirt road in the United States and that there is expended annually on these roads about $80,000,000, perhaps it will be worth the while to reflect on the efficient and inexpensive solution discovered by the Kentuckian with a direct and simple way of walking through a problem.

Henderson, Ky. LEIGH HARRIS.

NOTES

A highway bond issue of $175,000 has been voted in wards 1 and 2 and part of ward 6, comprising the river section of Bossier Parish, La.

The County Commissioners of Galveston County, Tex., have called an election for Aug. 24, at which time the voters will decide on a bond issue of $250,000 for the purpose of augmenting the present system of county highways.

The establishment of a civic center and the construction of a 100-ft. street, 5 miles in length, between Port Arthur and Fort William, Ontario, is under consideration by the authorities of the former city. A 45-mile road to the American boundary, which, connecting there with a road from Duluth, Minn., will connect that city with Port Arthur and Fort William, is now being built. It is reported that it will probably be macadamized next year, mostly with trap rock.

PERSONAL NOTES

H. R. Evans has resigned as City Engineer of Williston, N. D.

W. D. Bradshaw has been elected Road Superintendent of Volusia County, Fla., at a salary of $200 per month.

F. P. Wilson has been appointed City Engineer and W. F. Judd has been elected Street Commissioner of Mason City, Iowa.

N. C. Hubbs of Salem, Ore., has been placed in charge of street work of Silverton, Ore., to fill the vacancy occasioned by the resignation of C. A. Hartley.

Cyrus A. Libby, of Everett, Mass., has been appointed a member of the City Engineer's staff of Manchester, Mass., in charge of bituminous street construction.

Professor Arthur H. Blanchard, of Columbia University, New York, N. Y., and Prevost Hubbard, of the Institute of Industrial Research, Washington, D. C., have been retained, respectively, as Consulting Highway Engineer and Consulting Highway Chemist by the Department of Efficiency and Economy of the State of New York.

J. Y. McClintock has been reelected County Engineer of Monroe County, N. Y.

F. O. Stone, County Surveyor of Lackawanna Co., Pa., has been appointed Chief Inspector of the new system of county roads.

Harry H. Di Loss has been appointed a member of the Paving and Sewer Commission of Bridgeport, Conn., for a term of six years. Mr. Di Loss succeeds Frank T. Staples.

J. B. Girand, formerly Territorial Engineer of Arizona, and Samuel Lewis, formerly City Engineer of Las Vegas, N. M., together with Carl E. Hasse, have organized the Engineering Construction Co., with headquarters at Phoenix, Ariz.

Major W. W. Crosby, C. E., Consulting Engineer, Baltimore, Md., has returned from London, England, where he attended the Third International Road Congress as a representative of the American Road Builders' Association and the American Society of Civil Engineers. Major Crosby was one of the reporters from the United States on Question 3—"Construction of Macadamized Roads Bound with Tarry, Bituminous or Asphaltic Materials"—and on Communication 10—"Terminology Adopted or to be Adopted in Each Country Relating to Road Construction and Maintenance."

REPORTS

CALIFORNIA DEPARTMENT OF ENGINEERING; THIRD BIENNIAL REPORT, DECEMBER 1, 1910, TO NOVEMBER 30, 1912.—Paper; 6x9 ins., 263 pp.; illustrated.

The biennial report of the Department of Engineering of California for the two-year period ending November 30, 1912, includes discussions of various activities of the department other than road work. The portion devoted to road work, which comprises Part 3, occupies a little less than one-third of the report. It includes a history of the state roads and of state road work in California and a large amount of statistical information relative to the work accomplished and the status of the work at the date of the report. Besides that portion of the main report devoted to the matter of roads, one of the four appendices is devoted to road matters, consisting of the state highways act of 1909. The report is profusely illustrated throughout, the illustrations in the portion devoted to road work consisting principally of views showing improved state roads.

ALABAMA ASSOCIATION OF HIGHWAY ENGINEERS, ANNUAL PROCEEDINGS, 1912-1913. Paper; 5½x8½ ins., 56 pp.

The minutes of the first annual meeting of the Alabama Association of Highway Engineers held at Montgomery in January, 1912, the minutes of a meeting of the Board of Directors in January of this year and the minutes of the second annual meeting of the association in January of this year form the major portion of the contents of this report. There are also included a list of officers for 1913 and a list of members, revised to April 13, 1913. Included in the minutes of the second annual meeting are the annual address made at the 1912 meeting by President W. S. Keller, State Highway Engineer of Alabama; an address made at the 1913 meeting by John Craft, a member of the State Highway Commission of Alabama, and the following papers: "Earth Roads in Alabama," by G. N. Mitcham, Professor of Civil Engineering, Alabama Polytechnic Institute, and a member of the State Highway Commission of Alabama; "Sand-Clay Road," by Geo. C. Scales, County Engineer of Perry County, Ala.; "Macadam Roads in Northern Alabama," by R. P. Boyd, Assistant State Highway Engineer of Alabama; "Chert Road Construction in the Paleozoic Area," by J. W. Gwin, County Engineer of Jefferson County, Ala.; "Macadam Roads and Asphaltic Binders," by W. T. Moore, County Engineer of Lauderdale County, Miss.; "The Relation of the Engineer to the County Official," by T. D. Kemp, Resident Engineer of the State Highway Commission of Alabama, and "Convict Work vs. Contract Work," by S. J. Cumming, County Engineer of Russell County, Ala.

REPORT OF THE CARTHAGE SPECIAL ROAD DISTRICT OF JASPER COUNTY, MO., JAN., 1913. Paper; 6x9 ins., 22 pp.; illustrated.

Included in this are reports of the Commissioners of the Carthage Special Road District—Allen McReynolds, Dr. C. B. Guinn and Chas. A. Blair—and of Superintendent J. D. Clarkson. The two reports cover the two years ending Dec. 31, 1912, and present detailed information regarding the work done in the district, both by the commissioners and by the 365 Day Road Club, which, since its organization on January 1, 1911, has cooperated with the commissioners in the improvement of the roads of the district. The superintendent's report includes a detailed description of each of the eight roads laid out in the district and of the work done on them and also data on the finances of the district.

NEW PUBLICATIONS

THE THEORY OF LOADS ON PIPES IN DITCHES, AND TESTS OF CEMENT AND CLAY DRAIN TILE AND SEWER PIPE.—By Anson Marston, C. E., Director and Civil Engineer, and A. O. Anderson, B. S. in Mn. E., Assistant Engineer, Engineering Experiment Station, Iowa State College of Argriculture and Mechanic Arts. Bulletin No. 31 of the Engineering Experiment Station, Iowa State College of Agriculture and Mechanic Arts. Paper; 6x9 ins.; 181 pp.; illustrated.

This bulletin presents a technical discussion of the theory of loads on pipes in ditches and a detailed account of tests made on cement and clay tiles and pipes. The first two chapters are taken up by a review of the present situation in respect to drain pipes and a discussion of failures of tiles and pipes. The third chapter is devoted to a discussion of the theory of loads on pipes in ditches. Chapter 4 outlines the methods followed in testing, comparing the results of actual tests with calculated values. Chapter 5 describes standard methods for testing tile and pipe, and Chapter 6, which consists principally of tables and diagrams, is taken up by a statement of the results obtained from these tests. Two short chapters, 7 and 8, deal with testing machines for drain tile, sewer pipe and pipe laying. The bulletin is profusely illustrated by halftones and drawings and contains many statistical tables.

PROGRESS REPORTS OF EXPERIMENTS IN DUST PREVENTION AND ROAD PRESERVATION, 1912; Circular No. 99, Office of Public Roads, U. S. Department of Agriculture, Issued June 30, 1913.—Paper; 6x9 ins.; 52 pp.

Included in this are reports of the experiments made at Chevy Chase, Md., with oils, tar preparation and native asphalt emulsion in 1911; at the same place with bituminous concrete, cement concrete and oil cement concrete in 1912, and at Washington, D. C., with surface treatments of tar preparation and oils in 1912. There are also supplementary reports on the following experiments: At Chevy Chase, Md., in 1911; at Jamaica, N. Y., in 1911; at Ithaca, N. Y., in 1909, 1910 and 1911; at New York, N. Y., and Ridgewood, N. J., in 1910; at Boise, Idaho, in 1910; at Ames, Ia., in 1910; at Knoxville, Tenn., in 1910; at Youngstown, Ohio, in 1909; at Newton, Mass., in 1908; at Garden City, Dodge City, Bucklin and Ford, Kansas, in 1908; at Independence, Kan., in 1908, and at Bowling Green, Ky., in 1907. These experiments comprised work with bituminous concrete and bituminous macadam; surface treatments of various kinds; cement concrete and oil cement concrete pavements; slag; asphalt blocks; bituminous gravel; waste sulphite liquor;

molasses, oil and lime mixtures; and sand-clay, rock asphalt and oiled earth roads. The report contains a number of tables showing analyses of binders, detailed cost data and other statistics.

REINFORCED CONCRETE WALL FOOTINGS AND COLUMN FOOTINGS.—By Arthur N. Talbot, Professor of Municipal and Sanitary Engineering and in charge of Theoretical and Applied Mechanics at the University of Illinois. Bulletin No. 67, Engineering Experiment Station, University of Illinois. Paper, 6x9 ins., 114 pp.; illustrated.

Concrete wall footings and column footings are treated in this bulletin in four chapters. In the introductory chapter are included a statement of the general theory of the subject and analyses of wall and column footings; Chapter 2 deals with materials, test pieces and methods of testing; Chapter 3 with experimental data and discussion, and Chapter 4 comprises a summary. Considerable space is given in the bulletin to brief accounts of a large number of tests made during the past five years. The bulletin is profusely illustrated by both plans and diagrams and by halftones showing testing apparatus and footings after failure.

NEW MACHINERY AND APPLIANCES

Hand Distributor for Asphalt and Oil

An asphalt and oil distributor recently added to the line of road builders' equipment manufactured by the Union Iron Works, of Hoboken, N. J., is shown in the accompanying illustration.

"ELDUS" DISTRIBUTOR IN OPERATION.

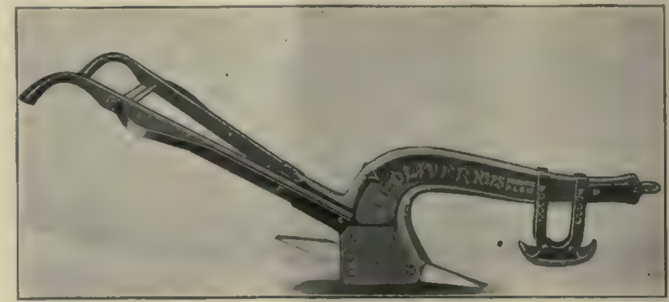
The distributor, which is known as the "Eldus," consists essentially of a 33-gal. tank with distributing device carried on a 2-wheel truck. The tank is rectangular in shape except that the bottom slopes slightly toward the rear. The top is fitted with two covers hinged near the center. In filling, the asphalt or oil is poured in from whatever receptacle is being used on the work through a removable screen. This screen is made of No. 15 iron wire mesh, can be easily removed for cleaning and is heavily enough constructed so that it may be handled roughly without injury. A valve in the bottom communicates with the distributing pipe, and is operated by the levers at the handles. The machine is fitted with 30-in. by 3-in. wheels, which are placed inside of the outer edges of the distributing device which covers a width of 2 ft.

In operation, the distributor is filled, the covers closed and the machine drawn by one man to the starting point. The operator then opens the valve and walks along the road until the tank has been emptied or until he has covered the required distance.

The advantages claimed for this machine are that it gives a more even distribution than can be obtained by hand pouring and that fewer men are required in the gang, five men at most being sufficient. The manufacturers recommend that four men be equipped with distributors and that the extra man be employed tending the kettle and loading the distributor.

Pavement Plow

The accompanying illustration shows a new pavement plow designed particularly for the use of contractors in street work where it is necessary to break up old pavements or especially hard ground.



OLIVER PAVEMENT PLOW.

This plow is built with especial attention to securing strength and durability, the beam having unusually heavy upper and lower flanges. The points are reversible and are made of crucible steel. The gauge shoe is adjustable and built with chilled metal wearing parts. The handles are braced as shown and equipped with steel straps at the sides. It weighs 280 lbs. and may be used with four or six horses or with a traction engine or road roller.

Among the advantages claimed for this implement are that because of the proper distribution of the weight along the beam, it is exceptionally durable and that the double reversible point of high grade steel gives long service.

The plow is known as the Oliver No. 25 pavement plow, and is manufactured by the Oliver Chilled Plow Works of South Bend, Ind.

NEWS OF THE TRADE

Van Duzen, Roys & Co. of Columbus, O., have issued a 2-page folder describing the Van Duzen concrete mixer mounted both on trucks and on skids, the mixer with hoist attached, the Van Duzen diaphragm pump and the Van Duzen engine. The folder measures 12½ by 7 ins. and is illustrated.

An attractively compiled booklet is being distributed by A. J. Cropp & Co. of Chicago, Ill. The booklet contains 16 pages and cover and is devoted to a description of the Cropp concrete mixer. Several illustrations showing the various types of Cropp mixers and their parts are included. The booklet measures 4 by 9½ ins.

The J. I. Case Threshing Machine Co. of Racine, Wis., has compiled a new catalogue of Case road building machinery. The catalogue contains a description of the Case 10-ton steam road roller, Case "Perfection" road graders, Nos. 1 and 3, Case 40 HP. gas tractor, the Case-Shelby road grader and leveler, the Case steel engine tender, the Case rock crusher, elevator and screen, and a line of road drags, grading plows, road rooters, two-wheel scrapers, Fresno scrapers, drag scrapers, and wheelbarrows. The catalogue comprises 16 pages and cover, measuring 6¾ by 10½ ins.

GOOD ROADS

A Weekly Journal of Road and Street Engineering and Contracting

Old Series, Vol. XLIV.
New Series, Vol. VI.

NEW YORK, AUGUST 9, 1913

Number
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UNDESIRABLE EXTENSION OF SECOND CLASS RATES

A bill "to amend the postal laws pertaining to the second class of mail matter," officially designated as H. R. 7084, was introduced in Congress on July 23 by Wm. Kent, Representative from the First District of California.

The bill is as follows:

> Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That publications and bulletins concerning roads and road building, issued in the several states by the duly commissioned authorities thereof, shall be admitted to the mails as second class matter under the following conditions:
>
> That the State officials desiring this privilege shall forward copy of each bulletin or publication, for which second class rates are asked, to the Secretary of Agriculture, who shall report to the Postmaster General his opinion as to the value of the publication, and that when his opinion is favorable the Postmaster General shall admit said document and give it a number, and that it shall be plainly stamped or printed as being admitted to the mails as second class matter under the terms of this Act.

According to a statement concerning the bill, issued by Mr. Kent, it is intended "to give a cheapened distribution to information of vital concern to the country." The statement continues: "Not less important is the clause providing for the approval of the Secretary of Agriculture. This clause means that all such matter would naturally be referred by the Secretary to the Bureau of Public Roads. This will permit the Department to get in touch directly with the various officials and commissions of the states, and permit co-operative work that will lead to uniformity of treatment and be of great benefit in that it will permit the Bureau to be a clearing house for the road building of the country."

It is difficult to see what results the passage of this bill would have except to put upon the Post Office Department an added and unnecessary burden, bring about unjustifiable discrimination in favor of public documents relating to road building as against other public documents, and confer upon the United States Office of Public Roads powers of censorship for which there is no excuse and which would undoubtedly be resented by the state highway departments and other official organizations having to do with state road work.

The extent to which the revenues of the Post Office Department would be reduced is difficult to estimate, and though it would probably not be excessive yet it would be adding uselessly to the expenses of a department which the public has always been led to believe is already overtaxed with matter which it has to carry free. The majority of the states in the Union are fully as prosperous as the national government and quite able to pay at the regular rates for the distribution of such publications as they may deem it desirable to send out.

That the bill discriminates in favor of a certain class of publications is evident, for if there is a good reason why public documents relating to roads and road building should be carried at reduced rates, equally good ones could be found for extending the same privilege to state publications dealing with all other matters of general public interest. The printed matter comprising the reports and special publications of the different departments of the state governments during a year is enormous, and to oblige the Post Office Department to transport all of this at materially reduced rates would be manifestly unfair.

As pointed out by Representative Kent's statement, the passage of the law would undoubtedly result in the submission to the Office of Public Roads of many state publications relating to roads and road building, though it is not certain that state authorities would always care to avail themselves of the privilege. Doubtless many local authorities would resent the idea that the judgment of any distant central bureau regarding the worth of a state publication was superior to theirs. Road building is to a large extent a local question. The methods and materials to be employed are determined principally by local conditions, and it is doubtful if the submission of state reports to a federal department would have any appreciable effect in standardizing methods.

As a whole, Congressman Kent's measure seems to be one of those ill-considered, though presumably well-meant, efforts to further road improvement by providing a means of tapping the federal treasury to lighten local expenses. It is to be hoped that the measure, like others of its kind, will die in the Committee on the Post Office and Post Roads, to which it was referred.

Governor Tener of Pennsylvania has signed the township road law, enacted at the recent session of the Legislature, placing approximately 70,000 miles of township roads under the supervision of a division of the State Highway Department, known as the Bureau of Township Roads. Governor Tener has also signed bills adding 77 new roads to the state main highway system and changing the routes of 15 state highways.

Proposed Street Improvements in the Borough of Queens, New York City

At a recent meeting of the local boards of the Borough of Queens, New York City, resolutions were adopted authorizing improvements to a number of streets in Newtown Creek, one of the local divisions of the borough. This action was taken in response to a statement by the Deputy Fire Chief in charge of the Fire Department of the borough, that the streets were in such condition that the apparatus of the Fire Department could not be hauled over them, and, on this account, the section was in danger of destruction by fire.

Among the streets designated for improvement were: Borden Ave. between Laurel Hill Boulevard and Greenpoint Ave.; Halle Ave. between Laurel Hill Boulevard and Hobson St., and Review Ave. between Laurel Hill Boulevard and Borden Ave. These will be paved with granite block. Sections of Halle and Berlin Aves. will be legally opened, and Montgomery, Clifton and Debevoise Aves. will be regulated and graded. The total estimated cost of these and other improvements is approximately $500,000.

Borough President Connolly has brought the action of the local boards before the Board of Estimate and Apportionment of New York City for its approval, and it is hoped to commence work on the streets before the end of the present season.

The Topographical Bureau of the borough has completed maps of two new streets which have been under consideration for a number of years. One of the maps shows the first section of a new boulevard which ultimately will extend through Rockaway Beach, Hammels and Arverne to Far Rockaway. The section shown on the map which has been completed runs from Fifth Ave., Rockaway Beach to Hammels Ave. Provision is made for a boulevard 80 ft. wide, parallelling the sea bulkhead at a distance of from 100 to 200 ft. Several sections will cross water. It will be necessary to bulkhead and fill in these sections. A considerable portion of the cost of this improvement will be paid by property owners at Rockaway and the necessary land will be donated by the owners.

The other map recently completed by the Topographical Bureau is that of the proposed extension of 13th St., Flushing, described in "Good Roads" for July 19. This street, which will cross the upper end of Flushing Bay, will shorten the distance between the village of Flushing and the Queensboro Bridge by nearly a mile.

Quarterly Report of the State Highway Engineer of Alabama

State Highway Engineer W. S. Keller of Alabama in his regular quarterly report to the State Highway Commission, for the three months ending June 30, submits an account of his automobile trip over the state, made in June for the purpose of gathering information relative to a proposed system of state trunk roads. Mr. Keller, who was accompanied on a part of the trip by John Craft, a member of the State Highway Commission, traveled a little more than 1,900 miles.

In his report Mr. Keller states that the publicity given his trip has aroused much interest in highway improvement throughout the state and that in many localities steps already have been taken to remedy faulty road conditions. He recommends that inasmuch as the report of the commission recommending the trunk line system cannot be made to the Legislature for eighteen months, another trip of inspection be made during the summer of 1914, and that as much publicity as possible be given to it months in advance.

In his statement of the number of state aid contracts let during the three months and the amount of money involved, State Highway Engineer Keller shows that 14 awards were made for work in Marshall, Lee, Marion, Franklin, Coosa, St. Clair, Blount, Lowndes, Lawrence, Marengo, Butler, Calhoun, Shelby and Pickens Counties, the total cost being $79,500. Of the whole amount work costing $59,500 was contracted for during June. In addition state aid was accepted in St. Clair, DeKalb, Walker, Madison and Colbert Counties, the work being done by county forces.

New Scenic Highway in Oregon

The County Commissioners of Multnomah County, Ore., have ordered work commenced on the county's section of the scenic road known as the Columbia River Highway, crossing the Cascade mountains and completing connections between The Dalles and Portland, Ore., and San Francisco, Cal.

The section of the proposed road in Multnomah County is 42 miles long, running east from Portland to the Hood River County line. The sum of $150,000 for the work of construction was included in the county tax levy for this year. The work will be done under the direction of County Surveyor H. B. Chapman and County Engineer Holbrook. State and county convicts will be employed.

Proposed Street Improvement in Atlanta, Georgia

The City Engineer's department of Atlanta, Ga., has prepared a map and profile showing the proposed improvement and extension of South Prior St., leading from the center of the city to the Lakewood Park district, a large suburban tract belonging to the city.

It is planned to widen and regrade the thoroughfare, replace the existing Belgian blocks with a smooth pavement and eliminate a grade crossing near Ridge Ave. It is stated that when this work is accomplished the officials of Fulton County will extend the street beyond Lakewood Park, making a paved thoroughfare from Lakewood Ave. into the business district.

In addition the County Commissioners are planning to construct a 60-ft. road connecting the South Prior St. extension with Lakewood Ave., on the north side of the lake, completing a continuous driveway around the lake.

Proposed State Aid Roads in Kankakee County, Illinois

The Board of Supervisors of Kankakee County, Ill., has adopted resolutions providing for the improvemnt of about 240 miles of roads by state aid in accordance with the terms of the recently enacted state highway law.

According to a statement by County Surveyor S. C. Looker, the average cost of the improvement will be about $4,000 per mile, making a total expenditure, if the present plans are carried out, of nearly $1,000,000. The work of construction is expected to require several years to complete. A commission of five, appointed by the chairman of the board of supervisors, made the selections of roads to be improved, which include highways in Rockville, Mantino, Sumner, Essex, Salina, Limestone, Norton, Pilot, Otto, Bourbonnais, Aroma, Ganeer, Momence, Pembroke, St. Anne and Kankakee townships.

It is probable that bonds will be issued to pay the county's share of the cost.

Work has been commenced on the new highway system of Orange County, Cal., for the construction of which bonds to the amount of $1,270,000 have been authorized. The first contract comprises a stretch of road in Santa Ana 5½ miles in length.

The city trustees of National City, Cal., have passed an ordinance providing for changing the grade of Highland Ave. between Second and Third Sts. The proposed work involves the removal of 16,000 cu. yds. of earth and is said to be a preliminary step toward grading the street its entire length, 2½ miles.

Road Work in Tarrant County, Texas

A little less than two years ago road bonds to the amount of $1,000,000 and bridge bonds to the amount of $600,000 were voted in Tarrant County, Texas. About half of the bridge work has been done, and work was started on the roads in May of this year with James C. Travilla, formerly Street Commissioner of St. Louis, Mo., in charge.

The roads to be built will have a total length of about 133 miles and will be of asphalt macadam and of water bound macadam treated with asphaltic oil. There are already many miles of good gravel roads in the county, and in many cases the projected work will consist of resurfacing these roads. The width of pavement put down varies from 10 to 18 ft., which, with gravel shoulders, makes a 25-ft. roadway. All of the new roads are being built with a maximum grade of 5 per cent. It is stated that the cost varies from about $5,000 to about $8,500 per mile.

Many of the projected trunk highways in the Southwest pass through Tarrant County and Fort Worth, the county seat. Among these are the Meridian Road, from Canada to the Gulf, the Red River-to-the-Gulf Highway and the proposed Cross-Continent Highway. Fort Worth is also the terminus of several proposed roads, including the Scenic Highway extending to San Antonio, a demonstration road to be built by the government from Fort Worth to Mineral Wells and the Panhandle-Plains-Fort Worth Road.

Extensive Grading Contract in Massachusetts

The Massachusetts Highway Commission has awarded the contract for grading a section of state road in Berkshire County known as the Florida Mountain road, extending from the "Five Corners" in North Adams up the side of Florida Mountain to the Florida-North Adams line, a distance of approximately 20,000 ft.

The work will include about 36,500 cu. yds. of earth excavation and the removal of 18,000 cu. yds. of rock. In addition about 3,000 cu. yds. of material will be taken from the neighboring hillsides for fills. Changes in the route of the existing road will necessitate the clearing of 12 acres of wooded land. The contract also calls for approximately 400 cu. yds. of concrete masonry and 14,000 ft. of guard rail of various types.

The work will be done by William T. Davis of Canton, Mass., and Nathan S. Brock of Boston, who secured the contract on their joint bid of $63,736.

It is stated that a portion of the $17,500,000 loan which the government of French Indo-China has been empowered to issue will be devoted to the construction of roads.

According to a statement in a recent issue of the Daily Consular and Trade Reports, the municipality of Bucharest, Roumania, has been authorized to contract a loan of $2,000,000 to expend in improving the streets of the city.

The portable paving plant belonging to the state of Nebraska is transported on what is stated to be the longest single car on any railroad in the world. The car is over 90 ft. long and with the plant aboard weighs 176,000 lbs.

The City of Ogden, Utah, has made arrangements to lease 40 acres of mountainside, containing what is said to be an inexhaustible supply of quartzite for road building. The lease is to run five years, and under its terms the city will pay 10 cts. per ton for the first thousand tons and 5 cts. per ton for the remainder. A rock crusher and other machinery will be installed immediately.

Proposed Road Improvement in Hennepin County, Minnesota

Plans for the improvement of the Rockford road in Hennepin County, Minn., have been approved by the board of county commissioners after preliminary hearing on a petition presented by the Minneapolis Civic and Commerce Association.

Four other petitions for highway improvement were presented for hearing by the association, but were held over pending a decision by the attorney general as to whether the county has a right to pay both the one-fourth of the cost prescribed by law and the one-fourth which ordinarily would be charged against property owners. The estimated cost of the Rockford road improvement is $110,000.

The total amount involved in the four petitions on which decision was withheld is $292,000, divided as follows: Territorial road, $35,000; Excelsior road, $48,000; South Watertown road, $170,000; Eden Prairie road, $39,000.

The Effects of Good and Bad Roads

A large mailing card on which is reproduced a cartoon from the Spokane "Spokesman-Review" of May 24, 1913, is being distributed from the headquarters of the Spokane County Good Roads Association at Spokane, Wash.

The cartoon, which was published on "good roads day," consists of two pictures which indicate by the expressions of the faces portrayed the effect, in one case of bad roads, and in the second of good roads. The faces are those of a farmer, a pair of horses, the farmer's wife, a commission man, a retailer and a consumer. Under each face in the two pictures are printed supposed comments on the state of the roads.

At the bottom of the card the following appears: "Your split log drag will do wonders to your crowned earth roads; use after every soaking rain just as the ground begins to dry out.—Compliments of Spokane County Good Roads Association."

The Board of County Commissioners of Madison County Ill., is preparing to construct 240 miles of state aid roads at an aggregate cost of $2,880,000.

A new highway, which will constitute the southern link in the chain of roads between Manila and Southern Luzon, P. I., connecting the towns of Albay and Sorsogon, is to be constructed within a few months.

The Town Commissioners of Rehoboth Beach, Del., have passed an ordinance prohibiting the passing of teams and wagons over the cement and brick sidewalks of the town. Violation of the ordinance is punishable by a fine of $5.

The State Roads Commission of Maryland is preparing to move its headquarters in Baltimore from Johns Hopkins University on North Howard St. to the Garrett Building at German and South Sts.

According to a report by C. V. Terwilliger, Director of Public Works of Scranton, Pa., paving amounting to 21,494 sq. yds., has been laid in the city for the portion of 1913 ending June 20.

A new municipal asphalt plant is being erected at Arundel and Burgess Sts., St. Paul, Minn., and is expected to be in operation Aug. 15. The first output of the new plant will be used to resurface Portland and Holley Aves. between Dale and Western Aves. About 11,000 sq. yds. of asphalt will be laid on each street.

Convict Labor in New Jersey

The first camp for housing convicts employed on the public roads of New Jersey has recently been established in Sussex County on the road between Andover and Newton.

The camp is officially designated as "Camp No. 1" and accommodates 35 convicts from the State Penitentiary at Trenton. The camp buildings include a large dormitory containing 30 cots and equipped with shower baths, lavatory and toilet facilities, a large mess hall and a smaller building for sleeping quarters.

MEETINGS

Great White Way Association of Iowa

The Great White Way Association of Iowa held its fourth annual outing at Pella July 26, several thousand people attending, according to reports.

The association has decided to mark the route of the "Great White Way" through the state with metal and wooden signs. The directors of the association have also decided to affiliate with the National Highways Association and to make the "Great White Way" a part of the system indorsed by that organization.

Colorado-to-the-Gulf Highway Association

At a meeting of the Colorado-to-the-Gulf Highway Association, held at Clarendon, Tex., July 25, it was decided to adopt the so-called eastern route as the Colorado-to-the-Gulf highway. This route runs from Amarillo along the line of the Fort Worth & Denver City railway to Fort Worth. The alternate route, which has been considered, runs from Amarillo to Corpus Christi by way of San Angelo, and it is expected that the construction of this highway independent of the eastern route will be advocated by the western representatives of the association.

The members of the association voted at the Clarendon meeting to begin an advertising campaign at once, and plans were made for an expenditure of $2,000 for this purpose.

COMING MEETINGS

August 11-13.—North Carolina League of Municipalities.—Annual meeting, Wrightsville Beach, N. C.

August 11-13.—Pacific Highway Association.—Fourth Annual Convention, Vancouver, B. C. Secretary, Frank M. Fretwell.

Sept. 17-18.—National Paving Brick Manufacturers' Association—10th Annual Meeting, Cleveland, Ohio. Secretary, Will P. Blair, 824-826 B. of L. E. Bldg., Cleveland, Ohio.

September 29-October 4.—American Road Congress.—Annual session, Detroit, Mich. Secretary J. E. Pennybacker, Colorado Building, Washington, D. C.

October 7-10.—American Society of Municipal Improvements.—20th Annual Meeting, Wilmington, Del. Secretary, A. Prescott Folwell, 15 Union Square, New York, N. Y.

November 10-15.—United States Good Roads Association.—Convention, St. Louis, Mo. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

December 9-12.—American Road Builders' Association.—10th Annual Convention, First Regiment Armory Bldg., Philadelphia, Pa. Secretary, E. L. Powers, 150 Nassau St., New York, N. Y.

February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

National Paving Brick Manufacturers' Association

The tenth annual meeting of the National Paving Brick Manufacturers' Association is to be held at Cleveland, Ohio, on September 17 and 18, instead of during the winter months, as in former years. This change has been made in order to afford opportunities to inspect brick paved streets, replacing the usual program of written papers by these inspections and by discussion.

The holding of the meeting at Cleveland will give those attending the meeting an opportunity to see the many miles of brick pavements in and around Cleveland in Cuyahoga County. It is announced that state, county and city officials are to cooperate with those having the meeting in charge in making the event of particular interest.

The meeting will include automobile tours over the brick paved city streets and country roads and a dinner on the evening of the 17th, at which there will be informal talks on street and road building. The headquarters will be at the Statler Hotel.

A conference on concrete road building will be held at Chicago, Ill., Feb. 12, 13 and 14, 1914, according to a resolution adopted at a recent meeting of the Cement Products Exhibition Co. of Chicago. Invitations to attend will be extended to state, county, city and township officials, automobile and good roads associations, and others interested in highway improvement. Dr. W. F. M. Goss, Dean of the College of Engineering of the University of Illinois and President of the American Society of Mechanical Engineers, will be temporary chairman of the conference. An advisory committee comprising a number of state highway officials, city engineers, officers of good roads associations and others has been named.

PERSONAL NOTES

Ira B. Mullis has been appointed Highway Engineer of Yancey County, N. C.

George Luther has been appointed Street Commissioner of Poplar Bluff, Ia.

J. C. F. Groh has been appointed superintendent of macadam construction and inspector of paving and curbing work in Waynesboro, Pa.

F. H. McConnell has been appointed City Engineer of Caldwell, Idaho. Mr. McConnell is also County Surveyor of Canyon County, of which Caldwell is the county seat.

Frederick J. Cellarius and Harvey J. Dressler, formerly City Engineer and Assistant City Engineer respectively of Dayton, O., have formed the engineering firm of Cellarius & Dressler and will engage in practice with offices at 1001 Commercial Bldg, Dayton.

S. F. Tompkins of Joliet, Ill., has been appointed chairman of a permanent committee named by the Board of Supervisors of Will County to designate roads to be improved by state aid. Elmer Paddock, of Homer; Henry Deininger, of Peotone; Nicholas Engles, of Wilmington, and George B. Boardman, of Wheatland, are the other members of the committee.

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Street Improvement in Little Rock, Arkansas

Since January 1, 1913, the work of paving 76 blocks in eight improvement districts in Little Rock, Ark., has been completed, and the paving of 139 blocks in seven districts is now under way. In addition, plans have been prepared for the improvement of 86 blocks, making a total of 301 blocks of paving either completed or contemplated.

The cost of the work on the 76 blocks already paved is $456,000. The estimated cost of paving the 139 blocks on which work is now in progress is $934,000, and that of the paving in districts in which either contracts have been let, bids advertised for or for which plans are now being prepared is $516,000, making a total of $1,906,000.

The above figures indicate an increase of $1,393,000 over 1912, the total expenditure for street improvements in that year being $513,000.

Of the total amount of paving already completed since the first of the year 32 blocks have been paved with wood blocks, including 15 blocks on 23d street, 10 blocks on 7th street, and 7 blocks on 3d street; 28 blocks were paved with concrete, comprising 8 on 13th street, 11 on 10th and May streets, and 9 on College street; 11 blocks on 10th street were paved with Dolarway and 5 blocks on Broadway with asphalt.

Of the work now being carried on 32 blocks on Cumberland, 6th, 7th, 8th, 11th, 12th and 13th streets, are being paved with bitulithic; 46 blocks on Louisiana, 2d, Scott, Cumberland and Byrd streets and Rector avenue, are being paved with wood blocks; 50 blocks on 16th, 17th, Denison, Griffith, Kramer, W. 13th and May streets, and Park avenue, are being paved with concrete, and 11 blocks on Arch street, between 18th and 28th streets, are being paved with asphalt.

Contracts have been awarded for asphalt paving on 9 blocks of 4th street, between Main and Rector avenues and for concrete paving on 4 blocks of 11th street and Park avenue. Streets for which bids have been asked, but contracts not yet awarded include three blocks on Louisiana and 24th street and 12 blocks in District 212, comprising portions of 7th, Battery and High streets; 13 blocks on 24th street; 4 blocks on Thayer avenue, 30 blocks in District No. 220, comprising portions of 19th, 21st, 22d, 23d, Wolfe and Battery streets; four blocks on Markham street and 7 blocks on Denison street.

All work is being conducted under the supervision of Superintendent of Public Works Henry Levinson.

Highway Improvement Plans in Ontario

The Provincial Government of Ontario has taken preliminary action in a definite plan to establish a comprehensive system of improved roads throughout the province. At a Cabinet Council held July 29 a commission of three men was appointed to study methods used in highway construction and maintenance in various sections to make a systematic investigation of results obtained by different systems under varying conditions and to submit a general report to the government, recommending a plan of procedure. It is probable that the commission will be placed in charge of the work of carrying out the plans.

The commission appointed consists of Charles A. McGrath, C.E., chairman of the Canadian section of the International Joint Commission on Deep Waterways and former member of the Dominion Parliament for Lethbridge; William A. McLean, C.E., Provincial Highway Engineer of Ontario, and A. M. Rankin, a member of the Provincial Legislature. Both Mr. McGrath and Mr. McLean are well known engineers and have had extensive experience in road work. Mr. Rankin was formerly President of the Ontario Good Roads Association, and as a member of the legislature has taken an active interest in highway improvement, having introduced several measures relating to that subject. Mr. McGrath is chairman of the commission and Mr. McLean, vice chairman. The latter will have charge of construction work after a method of procedure has been adopted.

It is the plan of the government to provide the entire province, including the older sections in the south as well as the more sparsely settled counties in the north, with a connected system of good roads, linking together the important cities and affording easy means of marketing farm produce.

It is considered probable that the commission will recommend the extension of governmental aid in the matter of maintenance and repair of county roads.

Proposed Street Work in Miami, Florida

Acting on the recommendation of J. N. Hazlehurt, consulting engineer, the City Council of Miami, Fla., has ordered the improvement of streets at an estimated cost ranging from $125,724 to $155,686, according to material used. The area to be improved includes all of the business streets and some portions of the main thoroughfares leading out from the central part of the city.

According to Mr. Hazlehurst's estimates the cost of paving the district with brick would be $125,724; with sheet asphalt, $130,717, with asphalt blocks, $145,699, and with wood blocks, $155,686.

In addition to the paving, Mr. Hazlehurst recommends the widening of sidewalks on Twelfth St. to 14 ft. and on the other streets of the district to 10 ft. Twelfth St. is now 10 ft. wide and the others, which include Eleventh St. and Aves. B, C and D are all 8 ft. in width.

Funds Requested for Subsurface Work in Jacksonville, Florida

The Committee of Public Works of the Board of Bond Trustees of Jacksonville, Fla., has requested the City Council for paving certificates to the amount of $40,000 for the purpose of taking care of subsurface conditions on streets about to be paved.

Chief Engineer L. D. Smoot in an address before the council stated that the proper adjustment of the subsurface conditions was absolutely necessary before the work on about 100,000 sq. yds. of paving for which contracts have already been let could be started. Any change in the sewer and water connections resulting from the erection of new buildings would necessitate the cutting up of the new pavement if the work for which request was made were not done before the surface was laid.

He also stated that in a number of cases there are no drains or catch basins in the streets, and puddles of standing water on the new street surface will result, if they are not installed. The city's share of the cost of the contemplated paving amounts to about $85,000. The request was referred to the finance committee of the council.

Projected Boulevard Extension in Philadelphia, Pennsylvania

Bids were received August 15 by the Department of Public Works of Philadelphia, Pa., for the completion of Southern Boulevard in South Philadelphia. The boulevard, when completed, will consist of a center driveway 50 ft. wide with two side driveways each 26 ft. in width, with lawns and planting spaces between. The center driveway will have a strip of bituminous macadam pavement 30 ft. wide with waterbound macadam shoulders. The two side driveways will be paved with bituminous macadam. Dished brick gutters, which are considered more suitable for a boulevard will replace the existing curbs and gutters.

An election will be held Aug. 30 in Aransas County, Tex., for the purpose of voting on an issue of $155,000 in bonds. If the issue carries, the proceeds will be used to build a causeway across the bay from Live Oak Peninsula to Lamar.

William H. Connell, Chief, Bureau of Highways and Street Cleaning of Philadelphia, Pa., received bids for street grading and paving Aug. 1 aggregating over $160,000. The proposed work includes 39 contracts for grading on 50 streets, involving a total expenditure of about $83,000; asphalt paving on 5 streets, $17,500; granite block paving 2 streets, $7,000; vitrified brick paving 8 streets, $25,000; asphalt resurfacing 10 streets, $25,000; granite block paving and retaining wall, 1 street, $5,000.

The Municipal Commissioners of Dallas, Tex., have designated for improvement 18 streets, selected from a list of 87 for which petitions have been presented. The selections comprise extensions of existing paving or connections with stretches already paved, and were made in accordance with plans to establish a continuous system of improved streets. The total cost of the proposed work will be about $350,000, of which the city will pay $150,000 and the property owners $200,000.

Boulevard to be Constructed in Albany, New York

It is announced that work on the proposed boulevard to connect Delaware ave., in Albany, N. Y., with the stone road at Kenwood, will be started within a short time. An inspection trip was made recently by state and county highway officials, at which time a tentative route was decided upon. The boulevard, when completed, will be about 1½ miles long, starting from the stone road at the top of Bethlehem Hill, and extending in an almost straight line to Delaware Ave., at a point opposite Second Ave. The plans for the construction will include a viaduct across the Delaware and Hudson tracks and the Normanskill creek. This structure will be about 140 ft. above the water.

An appropriation of $100,000 for the work has already been made, and the Rensselaer County officials will take steps to obtain the right of way as soon as the plans have been formally adopted.

Street Improvement in Baltimore, Maryland

The Paving Commission of Baltimore, Md., is preparing plans for the improvement of 55,000 sq. yds. of streets comprising more than two miles. The estimated cost is about $135,000.

The streets to be improved and the material to be used follow: Eden St. between Eastern Ave and Madison St.; Monument St. between Wolfe and Milton Aves.; Gough St. between Central Ave. and Broadway, and Bond St. between Eastern Ave. and Baltimore St., 33,500 sq. yds. to be paved with sheet asphalt; Fayette St. between Charles St. and Broadway, 8,250 sq. yds. to be paved with vitrified brick; Chase St. between Milton Ave. and Broadway, 13,250 sq. yds. to be paved with bituminous concrete. Bids will be asked soon for this work.

In addition the commission plans to pave Water St. between Gay and South Sts., 2,150 sq. yds., with wood blocks.

The County Commissioners of Green County, Tenn., have awarded contracts for the improvement of highways at an aggregate cost of about $500,000. Of this amount $200,000 will be expended in macadamizing roads already graded. When the work is completed Green County will have 300 miles of improved roads of which 200 miles will be macadam.

The Board of Supervisors of Imperial County, Cal., has ordered County Surveyor Perry to prepare estimates of the cost of an 18-ft. concrete boulevard between Brawley and Calexico and between Holtville and El Centro. The order is preliminary to calling an election for the purpose of voting on an issue of bonds to pay the cost of the improvement.

MEETINGS

Convention of North Carolina Good Roads Association

The annual convention of the North Carolina Good Roads Association, held July 31 and Aug. 1 at Morehead City, was attended by about 200 delegates and visitors from various parts of the state.

At the opening session on the morning of July 31, Hon. Charles A. Abernathy delivered an address of welcome in behalf of Carteret County, in the absence of the mayor of Morehead City. Hon. John C. Drewry, President of the Raleigh Chamber of Commerce, responded in behalf of the delegates.

Following Mr. Drewry, Dr. Joseph Hyde Pratt, State Geologist of North Carolina and Secretary of the North Carolina Good Roads Association, read a report of the activities of the association since the previous convention. Dr. Pratt stated that as State Geologist he is constantly receiving requests for highway engineering assistance which he is unable to supply on account of lack of funds. "For this reason," Dr. Pratt stated, "it is believed that this association can do no better than to bring about a sentiment for state engineering assistance to the counties." Dr. Pratt further stated that numerous requests for engineering services were received from counties wherein individuals subscribed funds to be supplemented by money provided by the county commissioners for the improvement of specific roads.

A brief review of road legislation enacted by the North Carolina General Assembly of 1913 included in the Secretary's report, showed that 27 measures were passed providing for voting on bond issues of various amounts aggregating $6,315,000. Authority was extended to 105 townships or road districts to vote on bonds to the amount of $2,762,500. In addition a general act was passed applying to all counties of the state except four, providing that any township may issue bonds for road improvement not to exceed $50,000. Since the convening of the legislature, the report stated, a total of approximately $2,737,000 in bonds has been voted or validated in 25 counties and 30 townships.

Dr. Pratt strongly advocated the establishment of a state highway commission to have general charge of road work in the counties and townships as being the most certain method of insuring economy, efficiency and the elimination of local politics.

Following Dr. Pratt, Capt. R. C. Langdon, U. S. A., read a paper relative to the military value of good roads.

H. B. Varner, President of the association, delivered an address on the use of state convicts on the public roads, the trend of his remarks being to the effect that the prisoners should be employed on the roads rather than leased to private industries.

The session which was to have been held in the afternoon of July 31 was postponed until evening in order to give the delegates and visitors an opportunity to attend a fish fry and surf party on the beach, tendered by the city of Morehead. W. L. Spoon of the U. S. Office of Public Roads, spoke at the evening session on sand-clay roads, his address being illustrated with charts. He was followed by Hon. John H. Small, member of Congress from the First North Carolina District, whose remarks were of a general character. The first speaker of the morning session, Aug. 1, was W. S. Fallis, State Highway Engineer of North Carolina, who stated facts relating to the general maintenance of sand-clay, dirt and macadam roads. He was followed by Jesse Taylor, President of the Ohio Good Roads Federation, who spoke in favor of a system of national highways connecting the states of the country.

Arthur H. Blanchard, Professor of Highway Engineering at Columbia University, read a paper on the Third International Road Congress held at London, England, in June, of this year.

Representative John H. Small followed Prof. Blanchard with an address in which he referred to Prof. Blanchard's paper and promised to use his influence to have the United States become a member of the Permanent International Association of Road Congresses. He also favored a state highway commission for North Carolina, and stated that he had frequent calls for engineering assistance in his district and was often obliged to apply to the U. S. Office of Public Roads.

Following Mr. Small, Prof. T. F. Hickerson of the University of North Carolina, read a paper on the Duties of the Highway Engineer. His paper was followed by talks by road engineers, road superintendents, county commissioners, etc., who reported on the progress of highway work in their several sections. Among these were W. S. Fallis, who reported for Franklin, Iredell, Catawba and Vance counties; N. C. Hughes, Jr., for Halifax County; Mr. Woodward, chairman of the Board of County Commissioners for Wilson County; R. P. Coble, Assistant State Highway Engineer for Lee County; J. C. M. Valentine for Rutherford County, and John E. Moore for Northampton County. After the reports, James C. Wellons spoke in favor of bond issues for highway improvement. Mr. Bryan of New Bern spoke against bond issues.

It was voted that a committee be appointed to draw up a set of resolutions and present them at the next session of the State Legislature. In addition a resolution was adopted at the convention to the effect that in view of the conditions attending the employment, under existing laws, of state convicts by railroad corporations and of the fact that the railroads reimburse the state in stock in lieu of money, most of which stock in the opinion of the members of the association is valueless, and furthermore because it is apparent to the association that the convicts are needed on the public roads, the General Assembly of the state be requested to enact legislation prohibiting the employment of convicts by private industries and providing for working them on the roads. It was decided that a copy of the resolution be forwarded to every member of the General Assembly.

A resolution was also adopted expressing the belief that the United States should become a member of the Permanent International Association of Road Congresses. A motion was also adopted to request the State Legislature to enact a law establishing a state highway commission.

Officers of the association for the ensuing year were elected as follows: President, H. B. Varner; Secretary, Dr. Joseph Hyde Pratt; Assistant Secretary, Miss H. M. Berry; Treasurer, Joseph G. Brown.

The executive committee was authorized to select the meeting place for the next regular convention of the association.

A meeting was held at Huntsville, Ark., August 4, in the interest of the construction of a motor truck road between Huntsville and Springdale. As a result of the meeting, grading on the proposed thoroughfare has already commenced.

A meeting of the citizens of Sparta, Mo., and vicinity was held in the Youngblood Opera House in that city Aug. 2 for the purpose of formulating plans to improve the highways leading into the city. C. W. Youngblood was chairman of the meeting and J. C. Barnes Secretary.

Citizens of Drew County, Ark., held a meeting in the interest of good roads at Winchester, July 31. The meeting was attended by A. S. Kilgore, member of the Arkansas State Highway Commission, and E. A. Kingsley, State Highway Engineer. Following the meeting a tour of the county was made by automobile for the purpose of securing information preliminary to preparing plans for a system of county highways.

The Geigertown, Pa., Good Roads Association held a meeting July 31 in Slipp's Hippodrome, Birdsboro, and inaugurated a campaign to increase its membership. J. W. Jacobs presided and Harvey Plank was secretary. Among those who addressed the meeting were Dr. Hetrick of Birdsboro, E. M. Zerr, and others.

COMING MEETINGS

Sept. 17-18.—National Paving Brick Manufacturers' Association—10th Annual Meeting, Cleveland, Ohio. Secretary, Will P. Blair, 824-826 B. of L. E. Bldg., Cleveland, Ohio.

September 29-October 4.—American Road Congress.—Annual session, Detroit, Mich. Secretary J. E. Pennybacker, Colorado Building, Washington, D. C.

October 7-10.—American Society of Municipal Improvements.—20th Annual Meeting, Wilmington, Del. Secretary, A. Prescott Folwell, 15 Union Square, New York, N. Y.

November 10-15.—United States Good Roads Association.—Convention, St. Louis, Mo. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

December 9-12.—American Road Builders' Association.—10th Annual Convention, First Regiment Armory Bldg., Philadelphia, Pa. Secretary, E. L. Powers, 150 Nassau St., New York, N. Y.

February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

Road Meeting in Meridian, Mississippi

The Board of Trade of Meridian, Miss., has issued a call for a good roads convention to be held at Meridian, August 26, at 2 P. M., for the purpose of considering ways and means for adopting the most feasible routes for two proposed interstate highways, one being at Corinth and ending at Gulfport, and one beginning at Meridian and ending at Vicksburg.

This action was taken after correspondence and conference with business men's clubs, members of boards of supervisors, commercial organizations and highway officials in the counties through which it is proposed that the roads will be constructed.

One of the objects of the meeting is to take steps to adopt the best means of securing cooperation between the counties and towns for building the highways as speedily as possible. It is also expected that a permanent organization will be formed to execute the plans of the convention.

Taxpayers of the counties interested, members of the boards of supervisors, editors of newspapers, members of commercial organizations, civil societies, bankers, educators, merchants and others are particularly urged to attend.

W. S. Keller, State Highway Engineer of Alabama; L. E. Boykin of the United States Office of Public Roads and others are expected to address the convention. A night session will be held.

PERSONAL NOTES

E. P. A. Phillips of Hamilton, Ont., has been appointed Corporation Surveyor of the city of Port Arthur, Ont.

A. D. Williams of Marlington, W. Va., has been appointed Road Engineer of West Virginia.

W. C. Belding has been appointed Street Commissioner of Mason City, Ia.

Cyrus A. Libby has been appointed engineer in charge of bituminous street construction in Manchester, N. H.

W. W. Waters of Hot Springs, Ark., has been elected vice president for Arkansas of the National Highways Association.

Harmon M. Smith of Mechanicsville, N. Y., and J. B. White of Renssalaer, have been appointed assistant engineers with the New York State Highway Department.

C. M. Brooks, Division Engineer with the New Hampshire State Highway Department, has been elected an associate member of the American Society of Civil Engineers.

W. A. Casey, formerly a member of the staff of C. H. Topp, a consulting engineer of Esquimault, B. C., has been appointed municipal engineer of Esquimault.

George H. Fenkell has been appointed Commissioner of Public Works of Detroit, Mich., succeeding J. J. Haarer, who has been Commissioner of Public Works for the past eight years.

J. N. Ambler of Winston, N. C., has been elected consulting highway and bridge engineer of Davie County. Mr. Ambler will have charge of the expenditure of the proceeds of $175,000 of bonds recently voted for highway improvement.

John H. Delaney, Commissioner of Efficiency and Economy of New York State, has detailed Wood D. Loudoun, chief accountant of the department, to make a special investigation of the state highway department.

J. M. Robinson has been appointed sales manager of the M. Rumeley Co. of La Porte, Ind. Mr. Robinson was formerly district manager of the International Harvester Co. of America.

F. W. Heiskell, formerly assistant advertising manager of the International Harvester Co. of America, has been made advertising manager of the company, succeeding M. R. D. Owings. A. C. Seyfarth, formerly head of the production department, has been appointed assistant advertising manager.

NEWS OF THE TRADE

The Novo Engine Co. of Lansing, Mich., is distributing a four-page folder describing the gasoline engines for various purposes manufactured by the company. Illustrations are included showing the "Novo" 7 and 8 h. p. engine, the "Novo" 12 and 15 h. p. engine and the "Novo, Jr.," 1½ h. p. engine. The page measure of the folders is 7 ins. by 6 ins.

In a suit instituted in the U. S. District Court for the Northern District of West Virginia at Parkersburg, by Daniel B. Luten against Boyer, Patterson & Morris, in which Mr. Luten charged the defendant company with infringement of patent and asked for damages, decision was rendered favoring Mr. Luten and awarding him $1,500 and costs.

The offer of the Pioneer Tractor Mfg. Co. of Winona, Minn., to donate the services of a tractor and four road graders on the roads of Missouri on Aug. 20 and 21, officially designated as "good roads days," has been accepted by Gov. Major of Missouri. The road upon which this machinery will work is the one leading from the executive mansion to the State University in Jefferson City.

The annual meeting of the sales force of the Lehigh Portland Cement Co. of Allentown, Pa., was held Aug. 1 and 2 at the Elk's Club, Allentown. The meeting was conducted under the direction of B. L. Swett, sales manager of the company. One of the important features of the meeting was an address on concrete road building by T. R. Ferguson, representing the National Association of Cement Manufacturers.

The T. L. Smith Co. of Milwaukee, Wis., has just issued a new catalog of the extensive line of rock-ore and gravel handling machinery manufactured by the company. Besides a general description of the machines and their uses, the catalog contains specifications, tables of dimensions, etc., and letters of recommendation from users of the company's machinery. Pages 28 and 29 are devoted to a detailed description of a new double roller chain, return track elevator which has just been added to the line. The "Teesmith" portable bin, also a new design, is described at length on pages 34 and 35. The catalog comprises 40 pages and cover measuring 6 ins. by 9 ins. It is profusely illustrated with halftones and line cuts of excellent quality, and is printed on good stock.

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Report on Street Work in the Borough of Queens, New York City

The report of Joseph Flanagan, Commissioner of Public Works and Acting President of the Borough of Queens, New York City, for the quarter ending June 30, 1913, has recently been made public. It includes the reports of S. Howland Leavitt, Superintendent of Highways; Harold Tait, Acting Chief Engineer of the Bureau of Highways; Daniel Ehnthalt, Superintendent of the Bureau of Street Cleaning, and others.

Commissioner Flanagan's report shows that of the public money received $6,354.22 was for restoring pavements and for repaving, and that of the requisitions drawn on the Comptroller, $222,310.50 was for the Bureau of Highways and $127,024.83 for the Bureau of Street Cleaning.

Permits to open streets were issued as follows: To tap water pipes, 589; to repair water connections, 149; to make sewer connections, 405, and to repair sewer connections, 29.

In the report of Superintendent Leavitt the details of street work are set forth in a comprehensive table showing the nature and amount of work done on streets classified as "macadamized," "paved," "unimproved" and "asphaltic concrete," and upon culverts, bridges and catchbasins. A large part of the work of the Bureau of Highways was upon macadamized streets, as shown by the following items taken from the table:

Macadam pavement repaired	221,043	sq. yds.
Macadam pavement cleaned	87,846	" "
Macadam pavement resanded	113,932	" "
Macadam pavement sanded and screened	131,352	" "
Macadam pavement finished	342,043	" "
Macadam pavement sprinkled	248,797	" "
Macadam pavement regulated	23,525	" "
Macadam road picked up	94,208	" "

Other items of interest included in the table for macadamized streets are;

Loads of screenings used	2,152
Loads of broken stone used	6,716
Loads of worn out material hauled away	13,888
Sq. yds. of roadway regraded	6,511
Sq. yds. of dirt wings honed	412,942
Sq. yds. of tarvia spread	205,509
Lin. ft. of macadam cleaned	29,500

Some of the principal items for the repair of paved streets are as follows:

Granite pavement repaired	18,975	sq. yds.
Wood block pavement repaired	11,088	" "
Asphalt pavement repaired	409	" "
Cobble pavement repaired	1,323	" "
Trap rock pavement repaired	1,586	" "
Brick pavement repaired	9,052	" "
Slag pavement repaired	804	" "
Hassam pavement repaired	24	" "

According to the report of Acting Chief Engineer Tait of the Bureau of Highways, 20 contracts, amounting to a total of $94,239.56, were completed during the quarter. The work covered by these contracts included grading, paving, curbing, flagging, laying sidewalks and miscellaneous work.

The report of Superintendent Ehnthalt of the Bureau of Street Cleaning shows that 99 miles of street were swept, 7 miles of private streets were swept, and 30 miles of gutters were cleaned.

Marketing California State Highway Bonds

Difficulty having been found in securing a market for the bonds of the $18,000,000 issue voted for a state highway system in California, the State Highway Commission has recently sent letters to the boards of supervisors in the various counties urging the investment of available county funds in the bonds. The bonds bear interest at 4 per cent. and under a recent law the county supervisors are authorized to make such investments. In its letter the Highway Commission states the case as follows:

"All counties in California will profit by reason of the expositions and the resultant growth of the state, but the readiness with which a particular county may be reached and traveled will be an important factor in its obtaining a share of the benefits to which it is entitled.

"Consequently the counties should be willing to make every effort to aid and expedite the permanent improvement of state highways before 1915. Counties have already afforded valuable assistance to the commission in pledging rights of way and bridges, but the commission desires to call attention to another way in which valuable cooperation can be rendered toward the construction of the state highway system. It can be done through the investment of county moneys in state highway bonds."

To date about $4,000,000 worth of the bonds have been sold. The State Board of Control has purchased about half, with the state's money taken from the school fund.

About $84,000 will be available for the improvement of rural highways in Kenosha County, Wis., during the coming year. Of this amount $14,000 was raised by a subscription contest conducted by the Kenosha Automobile Club, and the remainder will be furnished by the state and the county.

Unit Costs of Street Work in Portland, Oregon

Prices bid for street and sewer work, which began to decrease in Portland, Oregon, in the fall of 1911 continued to go down during the early part of 1912, so that a level below any before obtained for public improvement in the city was reached, according to the 1912 report of City Engineer T. M. Hurlburt. This reduction, he states, was largely due to the greater number of contractors competing for street work, to considerably lower prices for materials and to a somewhat more plentiful supply of labor. He adds that in many cases the bids were lower than justifiable and resulted in losses to the contractors.

The decrease in the cost of various kinds of street work is illustrated by one of the tables in the book, in which the average costs of the several items in each of the past five years are shown. The accompanying table is a rearrangement of that in the report. It should be noted that where no average price is given for an item the omission is due to the fact that practically no work of that kind was done during the year.

Item	Year				
	1908	1909	1910	1911	1912
Earth Grading (per cu. yd.):					
Ordinary	$0.30	$0.30	$0.27	$0.25	$0.20
To subgrade for pavement	0.60	0.60	0.55	0.50	0.32
Cement Sidewalk (per sq. ft.):					
With paving improvement	0.12	0.11½	0.12	0.11½	0.09¼
Without paving improvem't	0.11½	0.11	0.11½	0.11	0.09
Cement Curb (per lin. ft.)	0.38	0.37	0.38	0.37½	0.31
Hard Surface Pavement (per sq. yd.).					
Asphalt	2.25	2.00	1.88	1.80	1.63
Bitulithic	2.15	2.15	1.88	1.88	1.85
Concrete	...	...	1.40	1.40	1.24
Gravel bitulithic	...	...	...	...	1.45
Hassam	...	1.90	1.78	1.78	1.63
Stone block	3.65	3.70	3.85	3.75	3.45
Wood block	...	...	...	2.93	...
Vitrified brick	...	3.35	3.50	3.35	2.90
Macadam and Gravel (per cu. yd.):					
Gravel	2.65	2.70	2.45	2.50	2.30
Macadam	2.10	2.05	2.20	2.20	...

Proposed Highway Work in Tripoli

By a recent vote of the Italian House of Deputies the sum of 100,000,000 lire ($19,300,000) was appropriated for expenditure during the coming year in Italy's enterprises in Africa. This fund, according to a recent statement in the "Daily Consular and Trade Reports" by John Q. Wood, U. S. Consul at the city of Tripoli, will enable the Ministry of the Colonies to carry out projected work comprising railway extension, the construction of three roads radiating from the city, and the systematizing of the city streets.

About $30,000 is to be expended on the road extending south to Gargaresch, $10,000 is to be spent on the extension of Sciara (road) Ricardo to the southeast, and $50,000 is to be devoted to the road to Tagiura. The length of new road built will be about 6¼ miles.

Considerable road work has already been done, most of it by Italian soldiers under the superintendence of military engineers. Some excellent highways have been built in this way in the Garian Mountains, according to Consul Wood's report.

Besides the sums allotted to the three roads leading out of the city of Tripoli, $250,000 is to be used for the systematic improvement of the streets of the city. This work is to be done in accordance with plans prepared by the Engineering Department and adopted some months ago. At the date of the report from Consul Wood, contractors were at work on the improvement of Via Azzia, the principal street of the city.

The method of awarding contracts for public work, which is explained at some length by Consul Wood, is interesting. All public work is planned by the Civil Engineering Department and the amounts that may be expended on the different projects are determined by the inspector of that department. Before bids are received on any work it must be approved by the Minister of Colonies. A list of contractors is kept on file at the department offices and the inspector has the authority of selecting from it those contractors whom he regards best qualified to perform any particular work. The list of those so selected is sent to the Secretary General for Civil and Political Affairs, who sends for the contractors, submits the plans to them and asks for bids at a certain per cent. below the estimates of the department. The contractors make their bids and submit them in sealed envelopes on a set date. They are opened in the presence of all interested parties and the contract awarded to the lowest bidder. As yet only nominal sums have been required of bidders as guarantees for satisfactory completion of work.

Pennsylvania Grange Opposed to Bond Issue

The legislative committee of the Pennsylvania State Grange recently issued a statement declaring the opposition of the grange to the proposed constitutional amendment permitting the state to borrow $50,000,000 for road building.

The statement alleges that there is no such thing as a permanent road; that some excellent earth roads are being made by the state in the improvement of the 9,000 miles of highway taken over, and that this improvement shows what can be done by scientifically handling earth roads; that instead of issuing bonds, the state should levy a one-mill tax on all personal property and corporations, which, it is contended, would exceed $7,000,000; that the carrying charges on the bond issue would amount to $3,000,000 a year, and that the loan proposition provides no method for distributing the money.

Projected Concrete Road in Utah

The construction of a concrete highway extending through Davis County, Utah, from the Salt Lake County line to the Weber County line is being considered.

A series of meetings was held recently in the county for the consideration of the question, and were attended by Governor Spry, State Engineer E. R. Morgan and City Treasurer Jesse D. Jewkes. The proposed road will have a length of 27 miles, and its cost is estimated at approximately $6,500 a mile.

Road Fund in Riley County, Kansas

It is reported that after the November taxes have been paid Riley County, Kan., will have a fund of approximately $17,000 for the construction of county roads. Of the total amount, over $2,000 will have been derived from taxes on automobiles and motor cycles. The bulk of the fund will come from the half-mill tax, levied by the county commissioners. County roads are to be designated at the September meeting of the Board of County Commissioners.

Work on the foundation of the new steel bridge over the Pennsylvania Railroad tracks and connecting Bloomfield District with Grant Boulevard in Pittsburgh, Pa., has been commenced.

The engineering department of Miami, Fla., has completed surveys for 50,000 sq. yds. of paving in the business district of the city. The area to be improved includes portions of Eleventh and Twelfth Sts. and Avenues B, C and D.

Available funds for road work in Cowley County, Kan., amount to about $27,000 this year. According to the Board of County Commissioners, no new roads are planned and the money will be used for the improvement and upkeep of the existing roads.

Road Work in the Federated Malay States

According to the 1912 report of the Director of Public Works of the Federated Malay States, the advent of motor cars, motor lorries and buses has made unusual demands upon the roads of the states, and these have been met by maintenance expenditures which, while slightly increased, have not been increased in proportion to the increase in traffic.

The roads in the states are classified as metaled, unmetaled and bridle roads. At the close of 1912 there were 2,077 miles of metaled roads, 217 miles of unmetaled roads and 1,560 miles of bridle roads. During last year $680,585 was expended in the extension of metaling over 79 miles of road and the building of 17½ miles of bridle road. During the same period $1,352,514 was expended for the maintenance and improvement of highways.

The Big Hole Road in Montana

The final survey for the Big Hole Road, a section of the highway connecting Yellowstone and Glacier National Parks, has recently been completed.

The section to be built is 26 miles long, and the cost of its construction will be paid in part by the Forest Service. The road will be of considerable historical interest as it crosses the Big Hole battle ground, passing close to the monument erected there. The battle ground is a 40-acre reservation located in the Beaverhead national forest.

Plans and specifications are being made, and it is expected that bids will be asked and the construction of the road commenced this fall.

Citizens of Meridian, Miss., living on 24th Avenue, between 7th and 8th streets, are to have the street paved at their own expense, it is reported.

About 1,500 ft. of concrete sidewalks are to be built on six streets in Bridgeburg, Ont. The contracts have been let and work has been started.

The election held in Wake County, N. C., on August 14 to decide the question of issuing road bonds to the amount of $1,000,000 resulted in the defeat of the issue.

The Board of Supervisors of Ford County, Ill., has decided upon the improvement of 126½ miles of highway by state aid under the terms of the recently enacted highway law.

The City Council of St. Paul, Minn., has approved an order for paving Summit avenue, between Lexington avenue and the River Boulevard with creosoted blocks. A bond issue of $274,350 to provide funds for the project has been approved.

Dodge City, Kansas, which is 41 years old, is to have its first paved street this summer, an ordinance having been passed by the City Commission for the paving of Third Avenue. This work is to be followed by the paving of other streets later.

Commissioner of Public Works Fenkell of Detroit, Mich., has announced that contracts for street work in the city will not be awarded to contractors who already are engaged in work for the city, although they may be the lowest bidders. The reason for this is the fact that too many streets are torn up at the same time and for too long periods. Bids for 11 new contracts were opened recently, and the discovery was made that several of the lowest bids had been submitted by contractors who had already been working to their full capacity on other street work. Mr. Fenkell decided to withhold the approval of the contracts until the contractors were in position to do the new work quickly. It is understood that some of the bids may be readvertised.

Bond Sale in Kern County, California

The Board of Supervisors of Kern County, Cal., is to receive bids on September 6 for $240,000 worth of 5 per cent. county highway bonds. This is the first block of the bonds, amounting to $2,500,000, recently voted by Kern County for highway improvement.

Kern County is one of the richest in the state, and except for a small bond issue made for the purpose of building a county court house has no other bonds outstanding. For this reason it is the expectation of Chief Engineer C. R. Sumner of the Kern County Highway Commission that a number of bids will be received, and that the issue will be taken up as rapidly as it is offered.

MEETINGS

Convention of the Pacific Highway Association

The fourth annual convention of the Pacific Highway Association was held at Vancouver, B. C., on August 11, 12 and 13

The convention opened on Monday with an invocation by the Bishop of New Westminster, and an address of welcome on behalf of the Government of British Columbia by Lieutenant Governor Patterson. Mayor Baxter of Vancouver welcomed the delegates on behalf of the city, and President Gintzburger made an address of welcome on behalf of the Vancouver Automobile Club. Replies to the addresses of welcome were made by visiting governors from the United States and by visiting presidents of automobile clubs. These were followed by the appointment of committees; an address on the "Pacific Highway in Oregon and Convict Labor on Roads" by Governor West of Oregon; the report of Major H. L. Bowlby, Executive Secretary, and an address on the "International Pacific Highway" by Frank B. Riley.

On Tuesday, August 12, the first address was made by Hon. Thomas Taylor, Minister of Public Works of British Columbia, his subject being "British Columbia Roads and the Pacific Highway." This was followed by short addresses by vice presidents of the Pacific Highway Association and by an automobile tour ending with a garden party at the residence of President Gintzburger of the Vancouver Automobile Club. The last event of the day was a lecture on road building. illustrated with lantern slides, by President Samuel Hill of the American Road Builders' Association.

On Wednesday, August 13, a river excursion was made to Wigwam Inn, Indian River. Addresses were made by Norman Abrams of Seattle, Samuel C. Lancaster of Seattle, Commissioner of the Rainier National Park, and W. W. Foster, Deputy Minister of Public Works of British Columbia. The last address was illustrated by lantern slides. The business of the day consisted of the reception of committee reports and the election of officers. Officers were elected for the coming year as follows: Honorary President, Judge J. T. Ronald; President, Samuel Hill; Honorary Secretary, Frank M. Fretwell; Vice Presidents for British Columbia, A. E. Todd and F. R. McD. Russell; for Washington, Norman Abrams; for Oregon, Frank Riley; for California, F. W. Jackson and A. W. Morrison; for Yukon Territory, Dr. Alfred Thompson, and for Alaska, Falcon Joslon.

The erection of an arch at the point where the Pacific Highway crosses the boundary between the United States and Canada, for the purpose of celebrating one hundred years of peace between the two countries was discussed, and a committee was appionted to investigate the matter. The members of the committee are J. T. Ronald, J. J. Donovan, Percy Fuller, Samuel Hill, A. W. Gould, E. Brown, H. Sitton, Frank Mackenzie and A. B. Abrams.

Road Meetings at Fort Worth, Texas

A meeting of various county officials' associations of Texas, the meeting of the Texas Branch of the Meridian Road and that of the Fort Worth Branch of the Southern National Highways Association were held at Fort Worth, Tex., early this month. The county associations which held meetings on August 7, 8 and 9, were the county judges and commissioners, the county and district clerks, the county and district attorneys and the county tax collectors and county treasurers.

One of the features of the meeting of the county officials' associations was the inspection of the road work being done in Tarrant County under the supervision of J. C. Travilla, former Street Commissioner of St. Louis, Mo. During the meetings Mr. Travilla gave illustrated lectures in which he explained the methods being followed in the expenditure of the $1,000,000 bond issue in the county.

At the meeting of the Texas Branch of the Meridian Road Association, held at the same time, the route of the road through Texas was finally selected. As decided upon, the road enters Texas, at Burkburnett on the Red River, and extends southerly through Wichita Falls, Henrietta, Bowie, Decatur, Fort Worth, Cleburne, Hillsboro, Waco and Bryan to Houston and Galveston. At Waco a line branches off through Austin to San Antonio and Laredo, and at San Antonio one branch extends to Corpus Christi through Beeville, and another to Galveston through Seguin, Gonzales and Bay City. D. C. Colp of San Antonio was elected President of the association and W. H. Beck of Fort Worth, Secretary and Treasurer. O. L. Williams of Bowie, President of the Colorado-to-the-Gulf Highway Association, was elected Vice President for the First, or North Texas Division of the highway. There are seven divisions in the state, and the selection of vice presidents for these was left until a later date. The seven vice presidents with the other officers will constitute the executive committee of the organization. The delegates to this meeting, about 75 in number, were given a luncheon at the Terminal Hotel by the Fort Worth Chamber of Commerce.

The Fort Worth Branch of the Southern National Highways Association was organized in Fort Worth on the evening of August 11, after addresses by Colonel Del M. Potter of Clifton, Ariz., President of the Southern National Highways Association, and others. W. G. Turner of Fort Worth was elected President, and W. H. Neck, Secretary and Treasurer.

One of the sessions of the state convention of the boards of county commissioners of Pennsylvania, held recently at Williamsport, was devoted to the subjects of roads and taxes. A. M. Liveright, Solicitor of Clearfield County, opened the discussion on roads, reviewing highway legislation and the progress of highway improvement, and urging the approval of the proposed $50,000,000 bond issue. Deputy State Highway Commissioner Joseph W. Hunter made an address on roads, and Max S. Erdman of Lehigh County reviewed the bridge laws of the state, declaring that they are antiquated. The meeting passed a resolution favoring the modification of these laws.

A good roads meeting was held at the Carnegie Library auditorium in Cleburne, Texas, recently for the purpose of arousing interest in the Meridian Road. The meeting was attended by D. E. Colp of San Antonio, President of the Meridian Highway Association, Secretary Beck of that association, and others from out of the city. The meeting was presided over by F. E. Johnson, President of the Cleburne Board of Trade, and a number of speeches were made.

COMING MEETINGS

Sept. 17-18.—National Paving Brick Manufacturers' Association.—10th Annual Meeting, Cleveland, Ohio. Secretary, Will P. Blair, 824-826 B. of L. E. Bldg., Cleveland, Ohio.

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February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

PERSONAL NOTES

Hans Helland has been appointed City Engineer of San Antonio, Tex., succeeding Aaron I. Pancoast.

James Sloan, Geo. W. Harris and Geo. F. Rucher have been elected Highway Commissioners of the Lompoc road district, Lompoc, Cal.

W. E. Baldris, formerly with the consulting engineering firm of Worley & Black, at Kansas City, Mo., has been appointed City Engineer of Dodge City, Kan.

Charles A. Magrath, W. A. McLean and A. M. Rankin have been appointed members of the new Highway Commission of the Province of Ontario, Canada.

A. D. Cash of Chicago, Ill., and G. E. Bradt of DeKalb County, Ill., have been appointed President and Secretary, respectively, of the new Illinois Highway Commission.

Wm. F. Knight, C. D. Daggett and T. D. Allen, of Pasadena, Cal., have been chosen to represent that city in the Advisory Board of the California State Highway Commission.

Nathaniel B. Ellery, formerly State Engineer of California, has formed a partnership with Wm. F. Martin for the practice of consulting engineering. The offices of the firm, which is designated as Ellery & Martin, are in the Merchants' Exchange Bldg., San Francisco, Cal.

B. H. Davis, consulting engineer, of New York, N. Y., has received the award of the first prize of $1,500 for his design for the proposed Ninth Street viaduct over the James River at Richmond, Va. Mr. Davis' design was submitted to the Administration Board of Richmond in competition with thirty others.

Paul D. Sargent, Assistant Director of the U. S. Office of Public Roads, has been appointed Chief Engineer of the Maine State Highway Commission. Mr. Sargent was the first State Highway Commissioner of Maine and served in that capacity until February, 1911, when upon the expiration of his term of office, he was succeeded by P. L. Hardison.

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Copy for advertisements of which proofs are to be submitted to advertisers should reach the New York office as follows: For insertion in the first issue of the month, by the fifteenth of the preceding month; for other issues, by noon on Thursday of the week before date of issue.

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Start Surveys on the Cascade Scenic Highway

A party of sixteen engineers from the office of the county engineer of King County, Wash., commenced the work of surveying the section of the Cascade Scenic Highway in that county Aug. 12.

King County's portion of the highway comprises 28.5 miles, extending from the Chelan County line near Stevens Pass to the Snohomish County line at Baring. Of the $3,000,000 bond issue recently voted by King County for the improvement of roads, the sum of $165,000 was designated for the construction of this section of the Cascade Scenic Highway. It is estimated that between 80 and 90 days will be required to complete the survey. The actual work of construction will probably be deferred until next spring.

The route of the projected highway passes through three counties of Washington, following approximately the main line of the Great Northern Railway between Seattle, Wash., and the Columbia River, a total distance of 175 miles. It passes through Everett, Monroe, Sultan, Index, Skykomish, Scenic Hot Springs, Stevens Pass on the summit of the Cascade Mountains, Cascade, Berne, Leavenworth, Cashmere and Wenatchee. Of the entire distance 129 miles lie along existing roads. Of the uncompleted portion 6 miles are in Snohomish County between Index and Baring, 28.5 miles are in King County between Baring and the summit of the Cascade Mountains, and 12 miles are in Chelan County.

In Chelan County the section of the proposed highway lies in a road district which is empowered to vote a 10-mill tax levy for highway purposes. The chief taxpayer in this district is the Great Northern Railway, the property of which is valued at $1,500,000, assuring from this source alone an annual income of $15,000 for highway construction. The cost of completing Chelan County's share of the highway will be about $50,000.

In Snohomish County, the third county through which the highway will run, it is said very little has been done towards preparing for the work of construction.

To Construct Big Basin Road in California

Preliminary surveys have been made of the proposed road known as the Big Basin Road leading from the Saratoga summit into the Redwood Park in Santa Clara County, Cal. The estimated distance between the Saratoga summit and the rim of the Big Basin is 28 miles. From the rim the route of the projected road runs a distance of 6 miles across the Governor's Camp to Bloom's mill, where it joins with the Boulder Creek road in Santa Cruz County.

It is stated that the surveys indicate that the grades on that section of the road between the summit and the rim of the basin will not exceed 5 per cent. at any point, and that it is possible to establish curves so wide that the road will be safe for automobile and other traffic. While the Boulder Creek road in Santa Cruz County is said to be in a dangerous condition for heavy traffic on account of sharp turns, it will be repaired soon and the curves modified so as to render it safe.

An appropriation of $70,000 recently made by the California Legislature for the improvement of the road in Santa Clara County will be available in a short time, and it is announced that the actual work of construction will begin within a few weeks.

Plan Park and Boulevard System in St. Joseph, Missouri

The first active step in the establishment of a park and boulevard system in St. Joseph, Mo., was made Aug. 14, when a tract of land on the northwest corner of 31st St. and Mitchell Ave. was acquired.

This is the starting point of a proposed boulevard which will extend from Mitchell Ave. north along 31st St. to Patee St., thence along Patee St. to 30th. Between Mitchell Ave. and Patee St. the thoroughfare will be 120 ft. wide, and between Patee and 30th Sts., 110 ft.

The boulevard will eventually lead to and through Bartlett Park to Ashland Ave. in the northeastern part of the city.

Propose to Eliminate Gutters in Los Angeles, California

The Public Works Committee, Los Angeles, Cal., has decided to recommend the elimination of gutters in streets paved with asphalt, and to ask the city engineer to be instructed, in preparing specifications for street work, to provide for laying surfacing material from curb to curb, except at cross-intersections, and in such cases as appear to demand other classes of construction. When gutters are considered necessary, the Public Works Committee has decided upon concrete.

This action was taken in response to a recommendation by City Councilman McKenzie, who has spent considerable effort to bring it about. Mr. McKenzie is said to have stated that the city can save over $300,000 a year on street improvements by pursuing this course.

The committee has also recommended that hereafter street railway companies be compelled to pave their portion of any street at the same time or before the contractor for paving the balance of the street is carrying on his work. This is the result of repeated complaints about delay in getting street railway tracks paved. It is said that in some cases the street railway's portion of the street has remained unpaved for months after the work of paving the rest of the street has been completed.

Honor System Used in Working Convicts on Illinois Roads

Governor E. F. Dunne of Illinois has decided to establish a convict road camp in Lee County, adopting the honor system among the convicts, whereby the prisoners will be worked without armed guards, each man being on his honor not to attempt to escape.

The governor has arranged to commute the sentence of each prisoner who works on the roads 10 days for every 30 he works. Selected men will be used for the experiment. The camp will be in charge of two supervisors who will be unarmed.

New Road From Mariposa, California, to Yosemite Valley

Preliminary surveys have been completed for a new road to be constructed from Mariposa, in Mariposa County, Cal., to the Yosemite Valley, by way of Briceburg. While the new route is the most direct between the two points, and crosses the mountains at a height of 3,500 ft. above sea level, covering a total distance of 32 miles, the grade nowhere exceeds 5 per cent., and between Briceburg and El Portal, a distance of 15 miles, the maximum grade is less than 2 per cent.

Contracts for the construction of the road will be let within a few weeks. The funds to pay the cost of construction, which will amount to about $130,000, have all been raised by public subscription, and most of the money is now in the hands of the committee charged with the construction. The road will pass through a rich mining and timber section which heretofore has not been opened up to the fullest extent.

Street improvements costing more than $250,000 are under way in New Haven, Conn. The work involves the paving of nearly 10 miles of streets. The materials used are creosoted wood block, sheet asphalt and bituminous macadam.

The cost of state road work in Washington, under way or contemplated, aggregates approximately $800,000. Of this amount $370,000 is now available, which, it is estimated, will be sufficient to carry on the work until March 1, 1914, when taxes for that year will become available.

As a result of a recent decision of Secretary of the Interior Lane to open the Coulterville Road from Modesto, Cal., through LaGrange to the Yosemite National Park to automobile traffic, a movement has been started in Stanislaus County to call a bond election in the near future, at which the proposition of issuing bonds to the amount of $2,500,000 will be presented to the voters. If the issue carries, the money will be used for the construction of a system of roads connecting all the principal cities and towns of the county with the state highway. The work of improving the Modesto-Yosemite Park Road is practically completed.

Street Improvements in Tampa, Florida

Figures taken from the records of the Street Department of Tampa, Fla., show that since the issue of bonds to the amount of $1,750,000 for municipal improvements one year ago, 310 blocks of pavement have been laid on the streets of the city.

Estimating the blocks as averaging 300 ft. in length, nearly 20 miles of the city's streets have been improved within that time. All these streets have been paved with brick with the exception of Bayshore Drive and Palm Ave. between Nebraska and Florida Aves., which were paved with asphalt block. In addition to the hard surface pavement, approximately two miles of macadam roadway has been built on several streets, the material being taken from the streets which have been resurfaced with brick.

The streets improved include portions of Morgan, Carew, Zack, 21st, 21nd, Ruby, DeLeon, Scott, Cass, Horatio, 18th, Azeele, Eagle, Mitchell, Harper, Corrinne, C, 12th, 19th, 20th, Bay, Ellamae and Water Sts.; Florida, Highland, 4th, 7th, Nebraska, Willow, Grand Central, Central, Michigan, Palm, Lamar, Cedar, Brevard, Garcia, Fielding, 10th, 8th, 6th, Swann, Bayshore and Francis Aves., and North Boulevard. In addition to the work already completed, the brick pavement on 7th Ave. between 10th and 22nd Sts. is being relaid and treated to a heavy coat of asphalt, the old brick being used wherever found in good condition.

The voters of the city of Orlando, Fla., have authorized a bond issue of $100,000 for the purpose of building brick pavements.

According to estimates prepared by City Engineer Seaman, of Long Branch, N. J., the total cost of resurfacing Broadway, 2d and 3d Aves., the 3d Ave. extension and Rockwell Ave. will approximate $145,000.

The City Commission of Montgomery, Ala., has adopted a resolution ordering the Seaboard Air Line Railroad to remove all of its tracks from the lower Wetumpka road with the exception of the one main line track. This action was taken in response to complaints by citizens living in the vicinity of the road and of farmers who use it going to and from the city.

Bruce Aldrich, who is in charge of the laboratory of the Board of Estimates of Baltimore, Md., will shortly visit Washington to inspect the government asphalt plant at that city, and report to City Engineer McCay. It is stated that City Engineer McCay favors the establishment of a municipal asphalt plant in Baltimore next year, being convinced that such an action would facilitate the solution of the street repair problem. The estimated cost of the plant required by Baltimore is about $20,000.

The City Commissioners of Salt Lake City, Utah, are contemplating the construction of a scenic boulevard following the Bonneville shore line at the base of Ensign Peak, and continuing to Bountiful. A delegation of citizens of Davis County, through which the proposed road runs, recently conferred with the commissioners on the subject. The members of this delegation are owners of property along the line of the road, and they have expressed themselves as willing to donate the right of way and construct the road themselves over their own property, if the city would build that part of it on the city's property around the base of Ensign Peak. Later members of the delegation accompanied several of the commissioners over the route. A preliminary survey has been made, and it is considered likely that work of construction will be begun in a very short time.

Contract Awarded For Revere Traffic Road in Massachusetts

The Massachusetts Highway Commission on Aug. 12 opened bids for the construction of the so-called Revere Traffic Road, extending from Eliot Square, Revere, to the Point of Pines. The entire cost of this road, including acquisition of necessary land and incidental expenses, will be approximately $300,000. The road will be constructed under the authority of a special act of the Legislature, which appropriated that sum for the purpose.

It is proposed to build a road for heavy and through traffic from Boston to the north, thus eliminating the necessity of such traffic going over the Revere Beach Parkway.

The length of the road is about two miles, and the greater portion of it is over unimproved salt marsh land. It will be 60 ft. wide, 30 ft. of which will be laid out as a roadway. The remaining 30 ft. is to be left for sidewalks and trolley tracks.

The contract for the construction was awarded to A. G. Tamasello of Dorchester, at $130,327, which was nearly $10,000 less than that of the nearest competitor.

The cost of street work under contract in Glendale, Cal., is said to be approximately $200,000. In addition, improvements are contemplated on Third, Ivy, Fifth and Sixth Sts., west of Central Ave.

The Executive Board of Charlotte, N. C., has created a new street improvement district, and will shortly advertise for bids for concrete and sheet asphalt paving, of which the city's share of the cost will be approximately $60,000.

Acting on the demand of Mayor Charles D. Haywood of Berkeley, Cal., the San Francisco Railway Co. has agreed to commence the work, on October 15, of paving the railroad's right of way on Shattuck Ave., south from Bancroft St.

The County Supervisors of Fresno County, Cal., have decided to purchase state highway bonds to the amount of $100,000 when the state authorities are ready to advertise a series of bonds for the purpose of building highways through that county.

The Board of Commissioners of Lee County, Fla., has ordered an election for Sept. 9 for the purpose of voting on the proposition of issuing $200,000 in bonds, the proceeds to be used in the construction of a system of county roads.

The Department of Public Works of Detroit, Mich., has been awarded the contract for paving East Grand Boulevard with sheet asphalt. The contract comprises 38,000 sq. yds., and the price was $1.17 per sq. yd. The contract was secured in the regular manner, by competitive bidding.

The awarding of contracts for the construction of 38 new roads in 20 New York counties, for which bids were received August 19, has been postponed until a definite settlement of the question of executive authority has been reached. The total approximate cost of the work is $1,500,000.

Plans have been prepared for the paving of the Alameda Road, a section of El Camino Real, between San Jose and Santa Clara, Cal. The total cost of improving this section will be about $200,000, which will be borne by the Peninsula Railroad Co., the property owners between the two points, Santa Clara County and the State of California. The roadway will be paved with concrete with an asphalt surface.

Street Paving in Louisville, Kentucky

The Board of Public Works of Louisville, Ky., is advertising for bids to be opened on Sept. 3 and 4 for two street paving contracts. One of the contracts is for the paving, with asphalt, of a district comprising Barrett St. between Broadway and St. Anthony St.; Logan between Breckenbridge and Kentucky Sts.; Sixth St. between Kentucky and St. Catherine; Broadway between Lincoln Court and Cecil St.; Madison St. between Preston St. and Broadway, and Chestnut St. between Preston and Madison Sts. Bids for this contract will be opened Sept. 3. The estimated cost of the work is $63,000.

The other contract, for which bids will be opened Sept. 4, is for the paving with brick of Shelby St. between Breckenbridge and Kentucky; 15th St. between Maple and Kentucky, and Walnut St. between Garden and Campbell Sts., at an estimated cost of $29,500.

The voters of Clarke County, Wash., have authorized an issue of bonds to the amount of $500,000 to pay the county's share of the cost of constructing the proposed bridge over the Columbia River between Vancouver, Wash., and Portland, Ore.

The Des Moines Asphalt Paving Co. of Des Moines, Ia., has increased its capital stock from $10,000 to $75,000. It is stated that the company will extend its operations throughout the state of Iowa.

Work will be commenced Sept. 1 on the Minnesota Valley Scenic Highway between St. Paul and Mankato, Minn. While designated as a scenic highway, this road will be built under the post road act passed at the last regular session of Congress. The national government will appropriate $25,000 of the cost, and the cities and counties through which the road will pass, $50,000.

The Levy Court of Newcastle County, Del., has awarded contracts for the construction of the Third St. bridge across Christiana River at Wilmington. Bids were received separately on the superstructure and substructure. James I. Vincent of Wilmington was awarded the contract for the superstructure at $112,000, and the Atlas Bridge Co. of Wilmington, Del., and Baltimore, Md., received the contract for the substructure at $75,295.14, making a total cost for the complete bridge of $187,295.14.

MEETINGS

Chattanooga-Athens-Knoxville Permanent Highway Association Organized

The permanent organization of the Chattanooga-Athens-Knoxville Permanent Highway Association was effected at a meeting held at Chattanooga, Tenn., August 14. The association was formed in the interests of the construction of a concrete road between Chattanooga and Knoxville, Tenn., a distance of about 120 miles, as described in "Good Roads" for August 2.

The meeting, which was held in the auditorium of the Chamber of Commerce, was attended by about 350 delegates, representing Hamilton, Knox, James, Bradley, McMinn, Monroe, Blount and Loudon Counties.

The program included an invocation by Rev. Dr. Loaring Clark, Rector of St. Paul's Episcopal Church, Chattanooga; an address of welcome by T. C. Betterton, Commissioner of Fire and Police, of Chattanooga; an address on highway plans of federal government, by Judge John A. Moon, Member of Congress from the 3d Tennessee district;

an address in behalf of the Madisonville-Maryville highway by M. H. Gamble of Maryville; an address in behalf of the Sweetwater-Loudon highway by Col. Sam E. Young of Sweetwater; an address by L. G. Walker, editor of the "Chattanooga Times"; an address on the subject "The Relation of Good Roads to Agriculture," by Capt. T. F. Peck of Nashville, State Commissioner of Agriculture; an illustrated address on the "Economic Side of Road Building," by L. E. Boykin, of the U. S. Office of Public Roads; the President's address, by Samuel H. Thompson, President of the temporary organization; an address by ex-Senator J. B. Frazier; the adoption of constitution and by-laws; the appointment of committees and the election of officers.

The following officers were elected: President, Samuel H. Thompson, Athens; Vice Presidents, N. E. Logan, Knoxville, George L. Hardwick, Cleveland, H. C. Adler, Chattanooga; Secretary, V. D. L. Robinson, Chattanooga; Executive Committee, T. F. Cooper, Blount; Jacob Smith, Bradley; T. R. Preston, Hamilton; Ed. Edwards, James; Joseph J. Price, Knox; C. H. Bacon, Loudon; Lutherson Emerson, McMinn; Ben B. D. Jones, T. H. McCrosky, Monroe; Chairman Publicity Committee, Ellsworth Wilson, McMinn.

The following resolution was adopted: "Be it resolved by the Chattanooga-Athens-Knoxville Highway Association, that the association and its members declare themselves in favor of and urge the passage of laws substantially providing for the following things:

"The creation of a system of state highways in the state of Tennessee which shall be under the control of a state highway commission;

"The construction, improvement, repair and maintenance of said system of highways to be under state supervision, the expense thereof to be paid wholly or in part by the state;

"The issuance of bonds by the state for the purposes above set forth;

"The levying of a substantial, annual, privilege tax upon all motor vehicles operated within the state, the income derived therefrom to be applied to the payment of interest on the said bonds, or to be passed to a sinking fund to meet the payment thereof at maturity, or to be used in the construction, improvement, repair and maintenance of said state highways."

A meeting of the Colorado to Gulf Highway Association was held at Clayton, N. M., August 28.

At a recent meeting of the Coos County Good Roads Association, held at Coquille, Ore., a special election to bond the county in the sum of $500,000 for the purpose of building highways was recommended.

A good roads meeting and picnic was held at Colbert, Okla., August 12. Plans for the proposed Denison Highway, running between Denison, Texas, and Oklahoma City, were discussed. The principal speaker was Col. Sidney Suggs, State Highway Commissioner of Oklahoma.

A meeting was held in the gold room of the Hotel Galvez at Galveston, Tex., August 17, at which the plans of the Colorado-to-the-Gulf Highway Association were outlined by O. L. Williams, President of the organization. The plans include the improvement of the highway between Denver, Colo., and Galveston, Tex.

A good roads association was organized at a recent meeting held at Denison, Tex. The charter membership is 200, and the organization will work in conjunction with the Denison Chamber of Commerce and the Red River Bridge Co. in the interest of a 3-mile macadamized road extending from the Red River Bridge to a point near Colbert. R. E. Borah was elected President, I. D. Coleman, Vice President, Tom Hamlin, Secretary, and J. M. Hurst, Treasurer.

COMING MEETINGS

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February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

The officers of the Southern Appalachian Good Roads Association are preparing the program for the annual convention of the organization, which will be held at Asheville, N. C., Oct. 22 and 23.

A meeting will be held at Lincoln, Neb., early in September to accomplish the organization of an association to promote the construction of the proposed Coast-to-Coast highway, which will include the River to River road in Iowa, the Omaha-Denver-Lincoln Transcontinental road, the Midland Trail and other projected highways.

PERSONAL NOTES

Mrs. Lucretia F. Donnelly has been appointed Village Engineer of Brockport, N. Y.

George D. Marshall has tender his resignation as Highway Engineer of Bexar County, Tex.

E. T. Hayman has been appointed County Engineer of Anne Arundel County, Md., succeeding L. H. Green, resigned.

William R. McClellan, Assistant City Engineer of Tacoma, Wash., died July 26, in that city, as the result of an automobile accident.

Joseph Firth, City Engineer of Charlotte, N. C., has tendered his resignation, to take effect Sept. 1. Mr. Firth has been City Engineer of Charlotte since 1907.

James Richard Bell, a bridge builder of London, England, died in that city Aug. 8. Mr. Bell built several important bridges. He was a member of the American Society of Civil Engineers and of the Institute of Civil Engineers.

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THE IDEAL ROAD

Probably few who are supposed to have any knowledge concerning the building of roads have not been asked, not once but many times, what is the best road.

Making this inquiry without in any way qualifying the question probably seems reasonable to the layman, and not so many years ago might perhaps have been justifiable from the standpoint of the engineer. It might also have been answered at that time. It can not be answered now, however, and whether or not it can ever again be answered is problematical.

Given complete data as regards location, traffic and all other conditions, the expert in highway construction can advise intelligently as to the kind of pavement which will most nearly meet the requirements in a given case, but without the complete information he can not hope to give any satisfactory answer.

Before the advent of the automobile, when the traffic consisted of horse-drawn vehicles, equipped for the most part with iron tires, water bound macadam was the standard construction for practically all roads except those carrying the heaviest traffic. But present traffic conditions are different. The vehicles using the roads consist not only of horse-drawn vehicles equipped with iron tires but also of motor-driven vehicles equipped with rubber tires. Moreover, these two dissimilar kinds are found in varying proportions. At present there is no standard type of construction; roads or streets carrying light traffic can be satisfactorily paved with certain materials, those carrying a heavier traffic can be paved properly with certain other materials and those carrying the heaviest traffic require still other kinds of pavements.

Considering these facts, the logical conclusion is that traffic is the chief factor in determining the type of construction to be adopted. It is also known that the two different types of vehicles now using the highways require different surfaces. It may be inferred, therefore, that so long as the traffic is mixed, and mixed in varying proportions, a pavement that will be universally satisfactory will not be found unless the amount of one or the other of the two kinds of traffic becomes small enough to be negligible. We can be certain that motor-driven vehicles will never become negligible factors, so that the next step to be taken is to consider whether or not the ratio between motor-driven and horse-drawn vehicles will ever become so great as to eliminate the latter from consideration. If this does happen, the situation will be similar to that before the advent of the automobile and we shall have a traffic varying only in intensity. In that case some certain pavement may be evolved which will be as universally acceptable as was the water bound macadam pavement under former conditions.

Unless this change in traffic does come about, it seems probable that the selection of the type of pavement to be put down will remain a problem which has to be solved for each particular road, having due regard to local considerations.

The foregoing are not views of "Good Roads" alone; they are the opinions generally held by highway engineers. Yet in the face of this almost universal knowledge, attempts to settle upon some one universally satisfactory type of pavement are constantly being made, usually by laymen. The most recent example of this was an interview given considerable publicity in the daily press, in which the contention was made that there were only two kinds of road which it was necessary to build.

Engineers, contractors and others conversant with the principles of road building fully realize the fallacy of such arguments, and are, of course, uninfluenced by them. At the same time, the publicity given to such erroneous conclusions does an amount of harm which it is difficult to measure and which it is even more difficult to remedy. The general public can easily be misled by misinformation of this character and may be induced thereby to take action which will work injury to the progress of rational programs of road betterment.

The charge is often made that engineers are too backward in placing before the public the principles of their profession, leaving it to others—usually lacking in the necessary knowledge to speak with authority—the work of popular education through the usual channels of publicity. In no branch of engineering is this situation more to be deplored than in highway engineering, and highway engineers should make an effort to do their utmost to counteract the influence of those who speak and write ill-advisedly upon the subject of road building.

THE USE OF BITUMINOUS BINDERS

Because practice in the use of the various bituminous materials for binding broken stone roads is less standardized than that in other branches of the art of road building and because of the importance of these materials to the road builder of today, the study of the problems incident to their employment is one of the most important matters with which highway engineers are concerned. The consideration of the various bituminous binders and their use is always accorded an important place on the program of a road convention and is probably discussed with more interest than any other one problem of construction.

On other pages of this issue is printed the general report presented by J. Walker Smith, M. Inst., C. E., Chief Engineer of the Local Government Board (Scotland) and Consulting Engineer in Scotland to the Road Board, on the third question in the program of the Third International Road Congress at London last June. The question—"Construction of Macadamized Roads Bound with Tarry, Bituminous or Asphaltic Materials"—covered the entire subject of the construction of bitumen bound broken stone roads, including not only bituminous macadam roads but also those roads built by the mixing method and generally designated in this country as bituminous concrete. Twelve reports were submitted on this question and are summarized in the general report referred to.

Mr. Smith's report is particularly well arranged, and, considering the number and length of the reports which it summarizes, is remarkably concise. It was discussed at the sectional meeting at which the question came up for consideration and certain amendments were made to the conclusions. The amended conclusions were, in the regular course of events, brought up for discussion at the final meeting of the congress for further amendment. The conclusions arrived at by Mr. Smith are printed as a part of his report, and the final conclusions as adopted by the congress (which were printed in full in the issue of August 2) are indicated by footnotes. It is interesting to note that in the case of this report the discussions at the sectional meeting and at the final meeting resulted in but few changes in the conclusions and that most of these changes were merely in phraseology.

In regard to the conclusions themselves, there is little to be said. Taken as a whole, they reiterate principles already accepted, in this country at least, and in addition urge the necessity of further study along certain specified lines. It should be said, however, that definite recommendations in regard to some details of practice are made and that as a whole the conclusions indicate advance toward the desired standardization of practice in this particular branch of road building.

GRADE CROSSINGS AND AUTOMOBILE TRAFFIC

That the development of new traffic conditions has necessitated the construction and maintenance of roads with a greater regard to making them safe has frequently been pointed out in these columns. The presence on the roads of automobiles, often heavy and driven at high speeds by powerful engines, has introduced into the modern road builder's problem a traffic factor naturally not taken into account in previous road work. When in rapid motion on a road built to accommodate an entirely different kind of traffic, the automobile is a possible source of danger, both to its occupants and to others, and not the least of the dangers to the motorists are grade crossings.

Fatal grade crossing accidents involving motor cars are of common occurrence, and though it not infrequently appears that the drivers of the automobiles are themselves at fault, yet the fact remains that at very many crossings there is inadequate protection for the automobilist. Before the advent of motor traffic, the grade crossing, though dangerous, was not so serious a menace as it is now. A very careful driver stopped his vehicle before crossing the track, if it seemed necessary, and made sure that no train was approaching. Those less cautious trusted to the sense of hearing to warn them of danger and, unless they heard a train coming, crossed without stopping. This was usually a sufficient precaution, for little team traffic was noisy enough on the average country road to drown the roar of an approaching train or the warning of the locomotive bell or whistle.

The result of those conditions is a great number of grade crossings where the railroad crosses at an elevation considerably above the general level of the road and is approached by short, sharp pitches; where trees and underbrush on the banks of cuts obscure the view along the track; or where all these conditions combine to render the crossing perilous, especially to motor traffic.

Drivers of automobiles do not, as a rule, stop their cars oftener than necessary and very few take the precaution of coming to a full stop before crossing a track at grade. Reliance upon audible warning is not so safe as in the case of a horse-drawn vehicle, for the noise made by the car tends to make hearing less acute. Moreover, the speed at which the automobile is apt to approach the intersection permits less time for looking each way along the track, and the driver himself is obliged to give more attention to his driving than is the driver of a team.

The number of grade crossings is so great and the cost of their elimination so high, that it must be many years before the danger can be removed by substituting under or over crossings. Protection by gates or flagmen is also costly and probably impracticable except in or comparatively ne centers of population. Audible signals, such as bells, installed at the crossings, are measurably efficient and are especially valuable at night. But for the larger part of motor traffic—which is day traffic—an unobstructed view each way along the track is the best safeguard so long as the crossing remains at grade.

Such provision cannot be made at all highway and railroad intersections, but it can be made in many cases and made by a comparatively small outlay. By the judicious clearing of trees and underbrush, by the cutting of banks or, where necessary, by a relocation of a part of the road, many crossings now forcing needless risks upon the road user may be made reasonably safe—to the ultimate benefit of all concerned.

Proposed Extension of Riverside Drive, New York City

The report of Frederick Law Olmsted and Arnold W. Brunner, who were appointed by George McAneny, President of the Borough of Manhattan, New York, N. Y., to study plans for the extension of Riverside Drive from its present terminus to the Borough of the Bronx, has been submitted, together with their suggestions as to methods of procedure.

For purposes of discussion the plan proposed is divided into three sections—the southern section, between 155th and 165th Sts.; the middle section, between 165th St. and a point about 3,000 ft. south of Dyckman St., and the northern section, extending from the last mentioned point across the Dyckman Street Valley and along Inwood Hill to the Borough of the Bronx.

The southern section between 155th St., at the northern end of the viaduct over the railroad tracks along Trinity Cemetery, and 150th St. was originally laid out as Riverside Drive. From 158th St. north it was laid out as Boulevard Lafayette. The roadway is at present at least 100 ft. wide throughout. It was built as an ordinary street with building frontage on the west side between the street and the river, and was laid out on such crooked lines that it is inconvenient and even dangerous.

Messrs. Olmsted and Brunner submit two plans for the improvement of this section. The one which the investigators consider the best, regardless of cost, involves the construction of a viaduct, 1,200 ft. long, northerly from 155th St., and north of that structure a new drive, west of the present Boulevard Lafayette and considerably below it, to a junction point near 165th St. This plan also provides for improving the curves and grades in Boulevard Lafayette, between 160th and 164th Sts. It is estimated that the cost by this plan would be $1,013,000, excluding planting or other improvement of park slopes. The other plan substitutes a fill for the proposed viaduct and differs also in some less important features. The cost by this plan, including the necessary improvements in Boulevard Lafayette between 161st and 163rd Sts., but excluding planting and other improvement on the park slopes as before, is placed at $485,000. Taking into account the cost of acquiring land and other expenses, as well as cost of construction, there would be little difference in cost between the two plans, according to the report, and it is recommended that the viaduct plan be adopted.

STUDY FOR TREATMENT AT "INSPIRATION POINT" NEAR CORBIN PLACE.

For the improvement of the middle section the plan proposed is a modification in detail of the original plan under which Boulevard Lafayette was laid out, providing for a 60-ft. roadway, which is considered ample to accommodate the traffic, with a 20-ft. sidewalk or promenade on the westerly side of the roadway where it will command the best view.

Wherever practical, without sacrificing alignment, the investigators suggest the shifting of the southerly line of the

STUDY FOR TREATMENT OF THE CONCOURSE AT THE NORTH END OF INWOOD HILL—PROPOSED RIVERSIDE DRIVE EXTENSION.

roadway to the east far enough to permit the construction of a 20-ft. walk west of the roadway without requiring the immediate reconstruction of the existing retaining walls.

The absolute control by the city of the slopes lying west of the drive is urged in order that the open view across the river may be preserved. The acquirement of certain lands on the east of the drive is also recommended for this section. These are included in the area between 165th and 167th Sts., where the land rises abruptly from the roadway. This elevation is covered with trees which the investigators suggest be preserved as a variation of the scenery of the drive. On account of the precipitous character of this section it would be necessary to construct a separate service road on a very high retaining wall, in order to make this land reasonably practical for the location of buildings facing Riverside Drive.

It is proposed in the report that the service street for house frontage which now parallels the roadway between 177th and 181st Sts. be extended further north, in connection with the proposed change of grade of 181st St., in order that a connection with the drive may be obtained at a good gradient. The location which has been proposed for the extension of Chittenden Ave. running parallel with Riverside Drive should be moved to the west half its own width, in the opinion of the investigators, so that a better depth of block will be obtained between Chittenden Ave. and Northern Ave. It is also suggested that the existing embankment between Chittenden Ave. and the present east line of the Boulevard Lafayette to be acquired for park purposes. The wisdom of the immediate construction of Chittenden Place as planned is seriously questioned in the report. As an alternative, it is recommended that the steep bank on which the thoroughfare would be laid out be acquired for park purposes.

In the northern section, where the chief problem has been the elevation of the necessary viaduct across the Dyckman Street Valley and of the approach to the proposed Henry Hudson Memorial Bridge connecting Inwood Hill with the Bronx, it is held that the main drive should be carried around the west side of Inwood Hill instead of over the top, in such a way that it will be possible to reduce the elevation of the viaduct over Dyckman St. to 100 ft. It is held that it would be a mistake to make the height of the proposed memorial bridge so great as to necessitate approaches on the tops of the highest hills on each side of the valley spanned by it, and it is believed that better results can be attained by fixing the bridge at a lower level.

The acquisition for park purposes of practically all the land between the drive and the railroad over the entire length of the three sections, except at certain points, is also recommended. The exceptions are for such easements as may be necessary for wharves, and for areas at 158th and Dyckman Sts. which would be left for commercial uses but subject to restrictions against the erection of buildings high enough to obstruct the view from the drive.

In concluding the report, it is recommended that the city proceed in the following order: (1) To acquire the lands and the rights in land necessary to carry out the plan recommended; (2) to negotiate with the New York Central and Hudson River Railroad with regard to the design and cost of a street over the proposed new railroad location northward from Dyckman St.; (3) to prepare plans for the continuation of Riverside Drive and Park through the Borough of the Bronx to the Yonkers city line, and, at the same time, preferably in cooperation with the city of Yonkers and the State Highway Commission or some special commission to be created for the purpose by the Legislature, to have plans made for a thoroughfare on the east side of the Hudson River in continuation of Riverside Drive to the northern part of the state, and (4) to carry on the work of construction in accordance with the plans recommended, section by section, as the city's finances and local conditions along the drive permit.

Reconstruction of the Ancient Fosseway in Nottinghamshire, England

After the Roman invasion of Britain many centuries ago, one of the first works of the conquerors was the construction of a system of military roads. The routes chosen for these roads were as direct as possible, and little attention was paid to grades. This method of location was probably followed because the roads were designed primarily for the passage of pedestrians and horses engaged in military operations, although the Romans did use wheeled vehicles to some extent.

As a rule, historical writers include in the old Roman system four main roads and a number of secondary roads. The four main roads soon became known to the English as Watling Street, Icknield Way, Ermine Street and the Fosseway. The latter name, according to one authority, "seems to be the Latin 'fossa' in its occasional medieval sense of a bank of upcast earth or stones," while other authorities claim the name to have been derived from the French "fosse," ditch, the word having been applied to the highway because of the ditches at the sides. The Fosseway extended diagonally across the southern part of England in a general southwesterly direction from Lincoln to Exeter, passing through Newark, Leicester, High Cross, Moreton-in-the-Marsh, Cirencester, Bath and Ilchester.

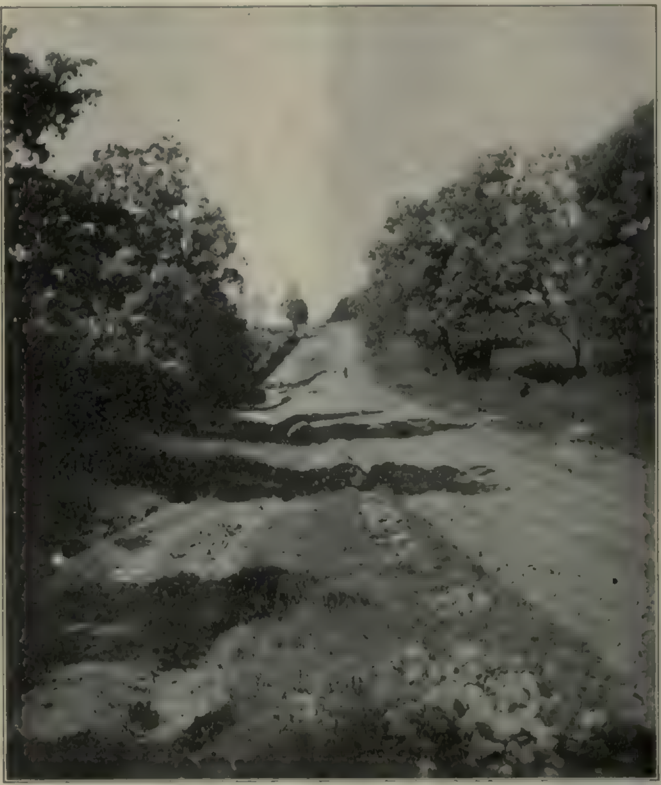

FIGURE 1—OLD FOSSEWAY, NOTTINGHAMSHIRE, ENGLAND—BEFORE RECONSTRUCTION.

There is now being built along the line of a part of the old Fosseway a road which is the longest stretch of new construction undertaken in England in many years. The seven accompanying illustrations show different steps in the laying of "tarmac" on the road in Nottinghamshire. The photographs from which the engravings were made were obtained from E. Purnell Hooley, County Surveyor of Nottinghamshire, by President Samuel Hill of the American Road Builders' Association, who, while in England for the Third International Road Congress last June, spent parts of two days with Mr. Hooley and visited the work.

Tarmac is a bituminous concrete which has been used extensively in England for both new construction and resurfacing work. The materials, blast furnace slag and a

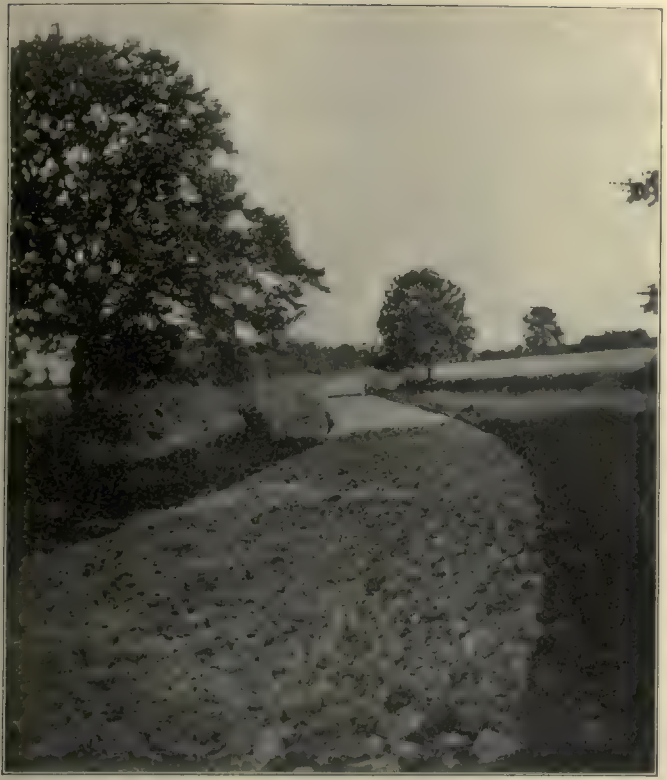

FIGURE 2—FIRST COURSE OF FOUNDATION—ROUGH SLAG.

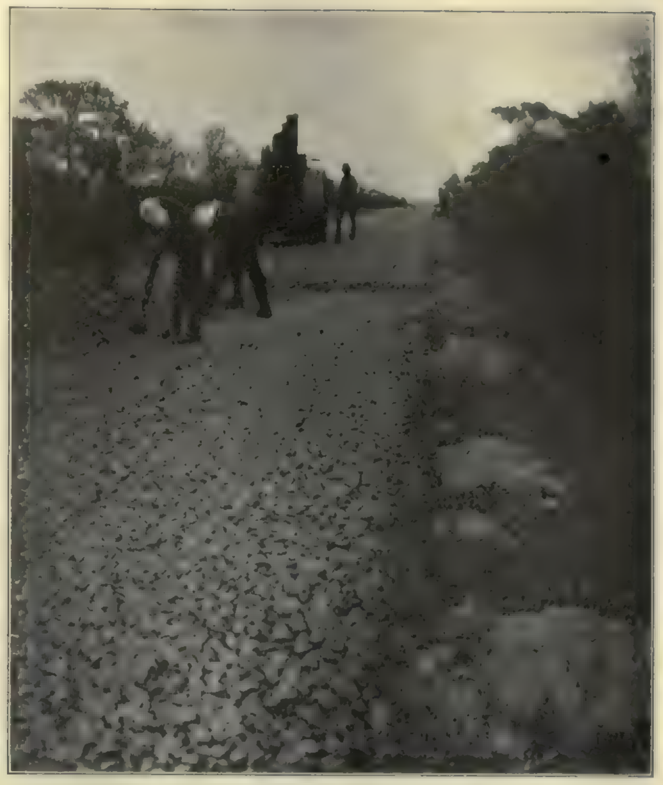

FIGURE 4—FIRST COURSE OF WEARING SURFACE—2¼-INCH TARMAC.

tar composition, are prepared at a central plant, conveyed to the work and laid and rolled cold. The tarmac is supplied in three sizes: 2¼-in. (from 2½ ins. to 1½ ins. in size), 1½ in. (from 1½ ins. to ½ in.) and ⅜-in. (from ⅜ in. to ⅛ in.).

In construction, the first course consists of 2¼-in. material, laid upon the prepared foundation and compressed by rolling to a thickness of 2½ ins. Upon this a course of 1½-in. material is laid to a thickness which will consolidate under the roller to 1½ ins., giving a total thickness for the two courses of 4 ins. After the rolling of the upper course has been about half completed, ⅜-in. material is brushed over the surface so as to fill the interstices, and the rolling completed. After this, the surface is covered with slag chippings at the rate of about one ton to each 250 sq. yds.

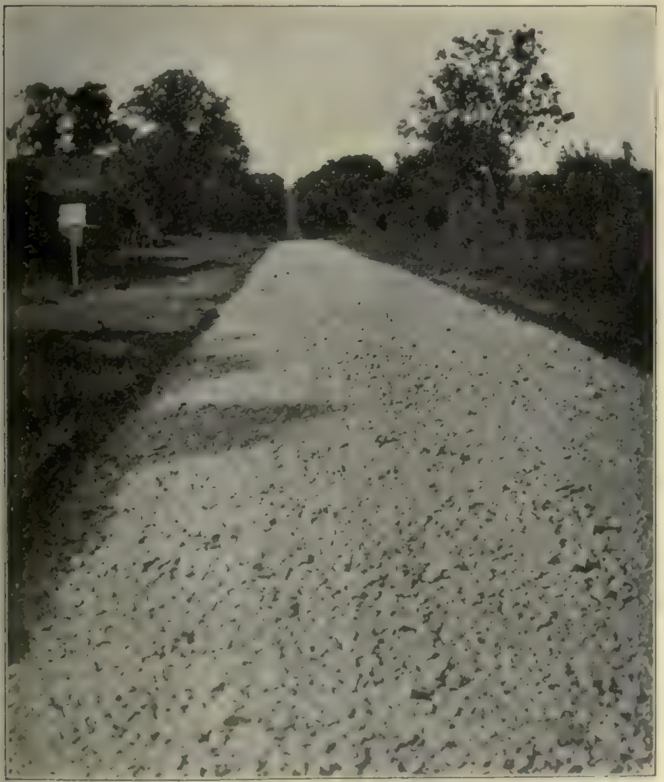

FIGURE 3—SECOND COURSE OF FOUNDATION—SLAG REJECTIONS.

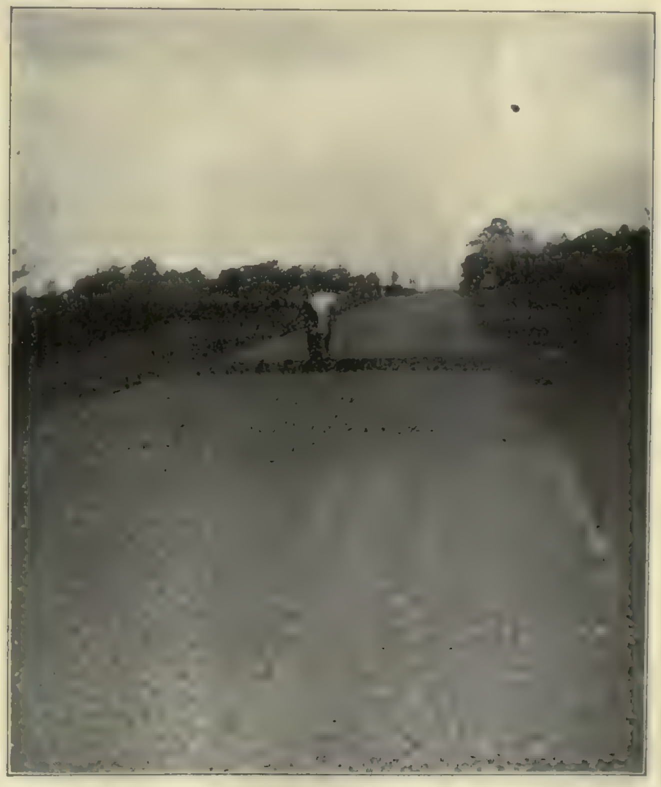

FIGURE 5—SECOND COURSE OF WEARING SURFACE—1½-INCH TARMAC.

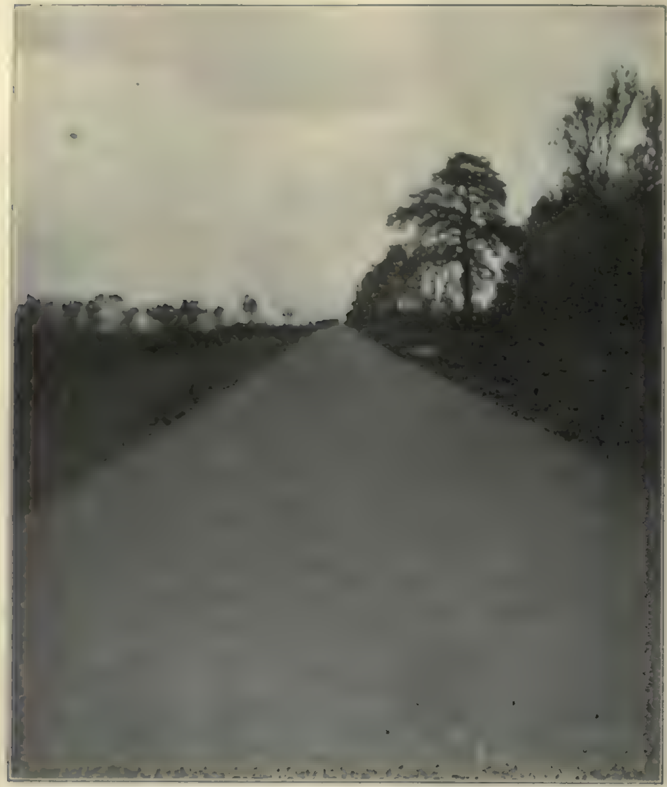

FIGURE 6—SURFACE OF THE FINISHED TARMAC PAVEMENT.

In constructing the foundation on the Fosseway, a course of rough slag and a second course of slag rejections were used. These two courses are shown in Figures 2 and 3, Figure 1 showing the road before improvement. On the foundation course were laid the two courses of tarmac, as previously described and as shown in Figures 4 and 5. The finished pavement is shown in Figures 6 and 7.

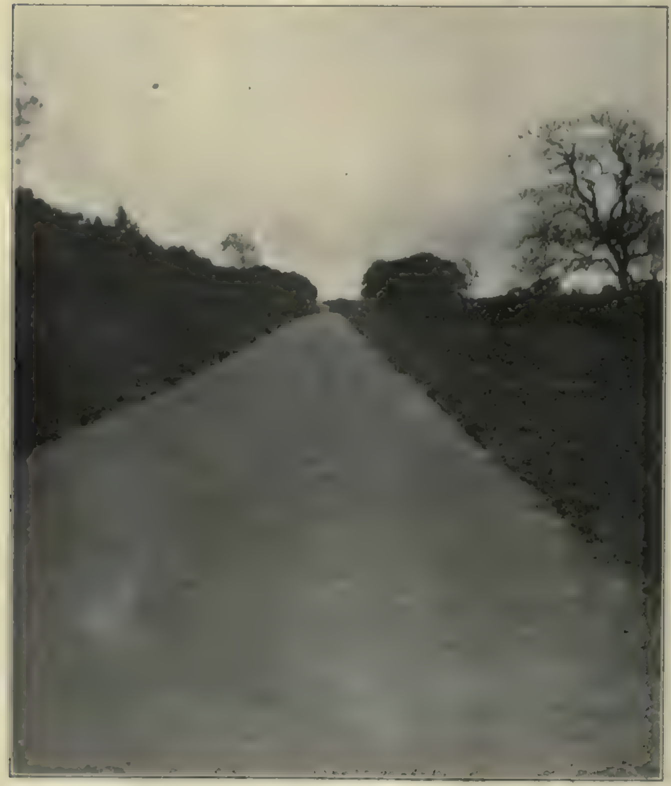

FIGURE 7.—VIEW OF THE FOSSEWAY, NOTTINGHAMSHIRE, ENGLAND—AFTER RECONSTRUCTION.

Standardizing Road Building Terminology

The recent International Road Congress, held in London in June, passed unanimously a resolution which may produce results of great importance and of wide interest. It was as follows:

"That an International Technical Committee should be appointed by the Permanent International Commission in order to study a standard method of obtainning information and data upon materials, physical conditions, local conditions, methods of construction, terminology, and other points concerning macadam bound with tarry, bituminous, or asphaltic binders. The report of the Committee should, after examination by the Permanent Commission, be presented to a next Congress."

Thereupon, the Engineering Standards Committee (supported by the Institute of Civil Engineers, the Institute of Mechanical Engineers, the Institute of Naval Architects, the Iron and Steel Institute and the Institute of Electrical Engineers, for the purpose of arriving at uniformity wherever practicable in the many matters arising under engineering practice) met and conferred with several of the American members of the Congress.

After discussion, it was agreed that the subject of terminology, referred to in the resolution, was one in which it was desirable that greater uniformity should prevail; that international uniformity could best be reached by first arriving at general agreement and at least approach to standardization in the different languages and then by coordinating the standards of the different languages, possibly through an international committee; that it seemed desirable to begin at once the effort of reaching standards of English terminology, and that the Engineering Standards Committee was a most desirable body to take charge of this work. It was thought that through a sub-committee on "Terminology of Road Work" of the above general committee, acting as a central point, and a committee selected from the American members of the Congress, a collection of the terms and their meanings most generally agreed upon could be made and coordinated so that general uniformity could be had in English. If then, at the same time, similar work could be done by French and German committees in those countries respectively selecting either language (English, French and German being the three official languages of the Permanent International Association of Road Congresses) when the work of the three committees should be finished it would be a comparatively easy matter to coordinate the results.

The Engineering Standards Committee voted to attempt the work and to provide a sub-committee as suggested, and extended an invitation to three Americans, Messrs. A. H. Blanchard, W. W. Crosby and Prevost Hubbard, representing three American committees already at work on the subject, to cooperate with its sub-committee.

A new road has been laid out between Georgetown and Seaford, in Sussex County, Del., which will shorten the present distance between the two points by about two miles. The new line runs direct from Georgetown through Hebron, Cokesbury and Middleford to Seaford. The total length of the road is fourteen miles. The work of construction has commenced, and it is estimated that the road will be finished by November. With the construction of the new road, use of an old county road which has existed for more than a hundred years will be discontinued.

Bonds to the amount of $125,000, recently voted by the village of Batavia, N. Y., for the purpose of paving East and West Main Sts., have been purchased by three local banks, the Bank of Batavia, the First National Bank and the Bank of Genessee.

Organization of the French Engineers of Bridges and Highways—Ingenieurs des Ponts et Chaussees

By JEAN de PULLIGNY*

The body of "Ponts et Chaussees" has, for its foundation, the patrolmen and chief patrolmen (cantonniers and chef-cantonniers) of the Ponts et Chaussees. These are plain laborers, generally of agricultural training who take care of a section of road, canal or canalized river (length, about 4 miles), under the direct orders of an assistant engineer called "Conducteur des Ponts et Chaussees." The "conducteur" generally resides in the capital of the "canton," and has with him, as help or deputy, one or more men, generally young, called "Commis des Ponts et Chaussees." The "commis" are recruited by an elementary competitive examination. The candidates have often served already in the offices of some "conducteur" or "ingenieur" of the Ponts et Chaussees as surveyor's helpers, draftsmen, designers, or practical helpers of some kind.

The "conducteurs" are also recruited by a competitive examination, but a more difficult one. Besides practical notions of surveying, of road and masonry construction and of mechanics of materials, a good knowledge of elementary mathematics, physics, electricity and chemistry is required, putting that examination on a level similar to that for the degree of Bachelor of Arts.

Many young "commis" of Ponts et Chaussees are amongst the candidates for "conducteur" and their practical knowledge serves them well in the examination.

The "ingenieurs" of the Ponts et Chaussees also called "ingenieurs ordinaires," are recruited for one part amongst experienced "conducteurs" who have had at least twelve years' practice since the time they graduated as "conducteurs" and for a greater part amongst the graduated students of the national training school called Ecole des Ponts et Chaussees. This school is entirely managed and supported by the government. It is located in a fine building of the 18th century in Paris, at 28 Rue des Sts. Peres. The professors are mostly chief engineers or general inspectors of the Ponts et Chaussees. The students are not boarders. They get a small pay as soon as they are admitted ($575 a year). This is sufficient to pay the living expenses of a very moderate boy in Paris. Most of them belong to families of small wealth and get a little help from them. Four-fifths of these students come from the Ecole Polytechnique, also a national school, entirely supported by government, about which a few words must be said.

Boys enter the Ecole Polytechnique at from 18 to 21 years of age by taking a very hard competitive examination, generally after two years of special training after their graduation as "bachelors of philosophy." At the Ecole Polytechnique they are boarders and the course lasts two years. They pay nothing and get no pay. The course is entirely of high science (mathematics, physics and chemistry) with little or no practical training.

At the end of the course, all students get an appointment in the government service. They can choose it on a list of offerings after they are classified by the results of a competitive examination, at the end of the second year. On the list of offerings are a few places in each of the national schools which the French government runs for training its own engineers—schools of mines, of bridges and highways, of gunpowder manufacture, of national factories (tobacco and matches), of telegraph and telephone, of ship building, etc. All these apppointments put together seldom number more than 30 or 40, and from 200 to 250 students enter and leave the Ecole Polytechnique every year. The engineering places are always chosen by the first on the list. The 200 others enter the military schools for artillery officers and military engineers.

The organization above described has been in operation for more than a hundred years. Quite recently, two years of military service have been introduced between the years of studies in the Ecole Polytechnique and in the Ecole des Ponts et Chaussees. But a new military law being contemplated, it is not necessary to insist on those minor changes.

It was said that four-fifths of the candidates for the Ecole des Ponts et Chaussees come from the Ecole Polytechnique. Those of the last fifth are taken from the "conducteurs" who have had at least six years of practice and are allowed, as a reward of very good services, to undergo a special and difficult examination showing that their knowledge of science is sufficient to keep up in the classes with the boys which come from the Ecole Polytechnique.

The courses of instruction at the Ecole des Ponts et Chaussees are distributed over three years, with a session of lessons lasting about six months each year, the remainder of the time being devoted to laboratory and field work, preparation of designs for examinations, visits to factories and construction works, and practical training by acting as assistant engineers on works.

The courses of instruction are under the following headings: Mechanics of materials and statics of construction; electrical engineering; industrial electricity; hydraulics; industrial physics; applied geology; architecture; properties of materials; practice of construction; general processes; roads, and railways on roads; bridges, masonry, steel and reinforced concrete structures; railroads and street cars; inland navigation; harbors and docks; drainage, irrigation and water supply; governmental laws and regulations; political economics; social economics.

The program of the examination on theoretical science that young "conducteurs" must take before entering the Ecole des Ponts et Chaussees, runs as follows: Algebra and analysis (theory of equations, differential and integral calculus); geometry (analytical geometry, two and three dimensions, descriptive geometry, graphical calculation and nomography); analytic mechanics; physics; chemistry.

Reference has been made to experienced "conducteurs" becoming "ingenieurs" of the Ponts et Chaussees without any school training, after twelve years' practice at least. They must also take a professional examination which begins by competition papers on electricity and electrical engineering, on railroads and street car lines, on governmental laws and on construction and maintenance of roads and harbor works. The second part of the examination includes two engineering designs, one of a bridge and the other chosen by the candidate from the following list: Summary design of road, railroad or street car line; of a canal, of a canalized river or of a navigation work; of a power plant or a water supply or sanitation works for a city. Finally, the candidate undergoes an oral examination on the construction and practice of the above works, on the keeping of accounts and on the governmental laws and regulations.

The graduated students of the Ecole Polytechnique have, as it has been said, a right to government appointments, but they are not obliged to take them They may resign and seek private employment. In the same way appointments as "ingenieurs" of the Ponts et Chaussees are offered to the students who have graduated from the Ecole des Ponts et Chaussees (after coming from the Polytechnique or from the "conducteurs") but they may overlook it, or if they enter the service, they may resign at any time. The only consequence is that they lose their rights to a retiring pension, which all government employees are entitled to in France, at 60 years of age and after 30 years service, the amount being about one-half of their average pay during the six years immediately preceding retirement. As students in the government schools enjoy a few privileges as to the duration and nature of their military service, if they resign before two or three years they may have some drilling period to fulfill before they are entirely free.

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*Chief Engineer of Bridges and Highways of France; Director of the French Mission of Engineers to the United States.

Above the "ingenieurs ordinaires" are "ingenieurs en chef," chosen from the lower grade after the necessary time of practice, and above the "ingenieurs en chef" are the "inspecteurs generaux," chosen from the "ingenieurs en chef." Those who are not promoted may be obliged to resign and take their pension; the "ingenieurs ordinaires" at the age of 60 and the "ingenieurs en chef" at 65. The "inspecteurs generaux" are obligatorily pensioned at 70. They may be pensioned at any age between 60 and 70, at their request or if they are judged unfit for service.

The salaries in the body of Ponts et Chaussees are as follows, according to seniority:

Grade.	Annual Salary.
Inspecteur General	$2,900 to $3,400
Ingenieur en Chef	1,930 " 2,300
Ingenieur Ordinaire	965 " 1,350
Conducteurs	425 " 965
Commis	280 " 675
	Monthly Salary.
Chefs Cantonniers	$25 to $27
Cantonniers	19 " 21

Many engineers and chief engineers are allowed to work for official bodies, such as cities, departments, chambers of commerce or others, and they get from $200 to $1,000 and more of extra pay in this way. A few get more from extra pay than from their state salary.

The government's works which are committed to the body of Ponts et Chaussees for construction, maintenance and management are the following: National roads; railroads, for construction only and for governmental inspection; canals and canalized rivers; docks and harbors; lighthouse service; drainage and irrigation; inspection of electric power plants; inspection of street car lines and road railways.

The works of the above description located in one or in a few neighboring "departments" form what is called a "service" and are put in charge of a chief engineer who reports directly to the Secretary of State for Public Works, at Paris. The "service" of a chief engineer is divided, under his orders, into several "arrondissements," each headed by a resident engineer, the "ingenieur ordinaire." The works in each "arrondissement" are divided, under the orders of the "ingenieur" into several "subdivisions," each in care of a "conducteur."

The Chief Engineer has the direction of the entire service and deals with the government and with all outside officials. The "ingenieur," with the assistance of the "conducteurs," proposes, prepares and executes what is to be done.

Government, in France, owns important properties, which in the United States belong to states, cities or companies. All these properties (see the foregoing list of works intrusted to the Ponts et Chaussees) are governed by that body and require a large amount of office work beyond the needs of the civil engineering works involved. For doing this work and also for the preparation of designs and the keeping of accounts each "ingenieur en chef" and each "ingenieur ordinaire" is assisted by a certain number of "conducteurs," "commis," clerks and typewriters.

Above the "ingenieurs en chef" are the "inspecteurs generaux" of second class and first class, the latter chosen from the former. France is divided into "circonscriptions," each containing several "services" of "ingenieurs en chef" and each headed by an "inspecteur general" of the second class. He makes a yearly visit to all the offices and all the works of his "circonscription" and sees that the rules and regulations on works and accounts are properly observed.

The "inspecteurs generaux" of the first class are only twelve in number. Their residence is in Paris and they form an advisory board for the Minister of Public Works. They are obligatorily consulted on all works of a certain importance and on any contemplated change in laws and regulations relating to public works. Besides, the minister may take their advice whenever he chooses and he does it very often. The "inspecteurs generaux" of the second class sit at the board for reporting on designs and questions relating to their "circonscriptions."

It has been said that the engineers of the Ponts et Chaussees are allowed to do some work for public bodies, such as cities, departments, chambers of commerce, etc. In one-half of the 86 departments they are intrusted with the care of the vicinal roads. They are consulted by the prefects on nearly all affairs of the communes involving some engineering question, such as water supplies, cemeteries, public slaughter houses, etc.

Many engineers hold appointments as heads of the national bureaus which form the central office of public works in Paris and they report directly to the Secretary of State.

At the present time all the bureaus of the office, except one, are headed by Ponts et Chausees men—two "inspecteurs generaux" and four "ingenieurs en chef" namely: Bureau of Secretary's Offices; Bureau of Roads and Navigation Works; Bureau of Railroads; Bureau of Staff and Accounts; Office of Tourism; Office of Water Transportation. The Bureau of Mines, Electricity, Power Plants and Aeronautics is headed by a chief engineer of mines, the government mine engineers being a body closely allied and quite similar to the body of Ponts et Chaussees.

"Ingenieurs" and "ingenieurs en chef" are even allowed to resign temporarily their state appointment and to enter the service of public corporations, such as railroad companies, cities (for managing all municipal engineering works), etc. They may enter the service of other state departments, and some occupy high situations in the Boards of Agriculture, Labor, Public Education (a few are college professors), Justice, War Department, etc. Some have been allowed to enter the service of foreign governments. Finally, many resign entirely and become heads of business companies of all kinds in France and in foreign countries, principally railroad, port and canal companies.

Shade Trees in Sidewalk Areas

One of the problems with which the municipal engineer is frequently confronted is that of preserving existing shade trees within the street lines in towns. In order to avoid sacrificing shade trees which are worth preserving and which are situated where the sidewalk is to be, it is frequently necessary to devise some means of building the walks around them and at the same time avoid injuring the trees.

In the city of Ghent, Belgium, according to an item in a recent issue of the "Daily Consular and Trade Reports," the problem is solved by encircling the base of the tree with an iron ring flush with the sidewalk surface and bringing the paving up to the outside of this ring. The ring is recessed on the inner side to receive sectional removable iron gratings, which are also laid flush with the sidewalk, the space between the tree and the ring being about 2 ft. The diameter of the outer ring may be made of a standard size, sufficiently large for use with any ordinary tree, and the gratings made in several different sizes, so that those may be selected which will fit reasonably close to the tree.

Construction of Bitumen Bound Broken Stone Roads*

By J. WALKER SMITH, M. Inst. C. E.†

The Permanent Commission has honored me with the appointment of General Reporter for this question and indicated my duty of submitting to this third Congress a short review of the chief features of this question, together with a summary of the papers which have been submitted to the Congress. The privilege of submitting his own views is also extended to the General Reporter.

Twelve reports upon this question have been submitted to the Congress and transmitted to the General Reporter for review. They comprise the following: America, Messrs. Blanchard, Crosby and Hubbard; Austria, Mr. Bradaczek; Belgium, Messrs. Brondeel and Macquet; Britain, Col. Crompton, Messrs. Butterfield, Gladwell, Greatorex, Hooley, Manning, Morris and Thomas; Egypt, Mr. Lloyd-Davies; France, Messrs. Wender, Le Gavrian, Mayer and Frontard; Germany, Messrs. Sperber, Vilbig and Wernecke; Greece, Mr. Callias; Hungary, Mr. Arpad von Rauch; Italy, Mr. Luigi Torri; Russia, Mr. Toukholka, and Switzerland, Messrs. An der Auer and Grivaz.

The general question under consideration is submitted for consideration in the following terms, viz:

Which are the best methods and materials for the construction in open country of macadamized roads bound with tarry, bituminous or asphaltic materials?

It was desired that reports sent in upon this general question should include specific comment upon all or some of the following sub-heads, viz:

1. Foundations and drainage.
2. Sizes and shapes of broken stone for bituminous bound surface crust.
3. Use of partially worn materials in bituminous bound surface crust.
4. Thickness and composition of the strength crust and of the super or wearing crust under different conditions.
5. Life of surface crust under different conditions of traffic, weather, subsoil, etc.
6. Relative importance of patching, repairs and periodical renewals of surface crust.
7. Extent of wear permissible before renewal of surface coating.
8. Measurement of wear and appliances used for this purpose.
9. Various methods of bituminous treatment.
    - (a) Mixing methods:
        - (1) In factories.
        - (2) On the spot.
    - (b) Grouting methods.
    - (c) Carpeting methods.
    - (d) Other methods.
10. Relative advantages and use of tar, tarry compounds, asphalt, bitumen and other materials.
11. Tests and chemical analysis of tarry, bituminous and asphaltic compounds.
12. Climatic effects causing slipperiness of the roadway; remedies.
13. Effect on public health, fish life or vegetation.
14. Specification of the methods of construction.
15. Cost data.
16. Cleansing and watering.

Having studied the reports submitted to him, the General Reporter has carefully considered the manner in which this question may best be presented to the Congress. He has concluded that it will be best firstly to review the reports upon the general question and then to submit his own views, embodying a general recommendation upon this general question. He will then briefly review the reports sent in, under the various headings Nos. 1-16, submitting his own observations and suggesting recommendations for the consideration of the Congress under Nos. 1, 2, 3, 6, 7, 8, 11, 12, 13, 14 and 16. He will briefly review and in some cases submit his own views, but will offer no recommendations under Nos. 4, 5, 9, 10 and 15, as the general recommendations under the general question will include consideration of these sub-headings.

It is feared that there may be some little overlapping in these sixteen sub-headings. This will be avoided so far as possible but is rendered the more difficult to avoid in that the various authors in their excellent reports have not been able to adequately express their views under the subdivided headings with which the question has been dealt.

General Question

America.—Which are the best methods and materials for the construction in open country of macadamized roads bound with tarry, bituminous or asphaltic materials?

The inherent advantages of the bituminous method of road construction are recognized. A considerable number of methods and materials of such construction is referred to. It is desired to select that type of road construction which will probably prove most economical and efficient under the peculiar conditions of any case. The value of keeping detailed records, including cost data, traffic records and analyses including the chemical and physical properties of the materials employed, is rapidly growing in appreciation amongst American highway engineers.

Austria.—It is accepted that surface tarring prevents formation of dust and the so-called curling of the road surface which occurs especially when the thaw sets in on roads which carry a great deal of cart traffic.

The Austrian experience has been practically confined to the surface tarring of ordinary macadam roads. Comparatively little has been done by way of construction with tar macadam. So far as a comparison is possible, the Austrian reporter is disinclined to give preference to tar macadam over surface tarring, either from an economical or from a technical point of view. He points out the financial advantage that has accrued from the execution of surface tarring work departmentally in lieu of through the medium of a contractor, and concludes that the best and cheapest way of making tarred roads in country districts is to construct them of ordinary macadam with hard broken stone, using sand as binding material, and to surface tar with proper machinery. Such work should be done departmentally by the road administration.

Belgium.—A certain amount of work which would come under the category of tar macadam has been executed, proprietary systems being adopted. The duration of the trials has been short and the traffic on the roads has been light. Under these circumstances, the only conclusion which the reporters can draw is that "the methods adopted all appear to offer sufficient advantages to justify fresh trials of a more extended character." These trials, they consider, should take place upon roads where the traffic is high speed as well as heavy, either mechanical or otherwise; but that the traffic should not be of great intensity, because in a country like Belgium where paving setts are easily obtained, they consider that where intensity of traffic will justify them there is a decided preference for their use.

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*General Report on Question 3—Construction of Macadamized Roads Bound with Tarry, Bituminous or Asphaltic Materials; Third International Road Congress, London, England; June23-28, 1913.

†Chief Engineer to the Local Government Board, Scotland, and Consulting Engineer in Scotland to the Road Board; General Reporter on Question 3.

Britain.—It is stated that self-propelled traffic absolutely requires a bituminous surface. Various methods have been successfully adopted in the use of bituminous binders for road construction. Surface tarring of ordinary macadam roads has long since been recognized as considerably prolonging the life of the surface, especially where rapid self-propelled traffic is considerable. It is urged that the surface tarring of the ordinary macadam road is excellent as a pioneer method for the suppression of dust until a probably more suitable and permanent but more expensive form of treatment becomes financially possible.

Tar macadam prepared in depots or at the roadside has been successfully used. The grouting method has been adopted with success, both where sand has been mixed with the binding pitch and where pitch alone has been used. Carpeting methods have been tried but no definite opinion can yet be expressed. Methods which involved the use of asphalt and other similar bituminous binders have been used in places with marked success. Granites, using the term in a generic sense, slag and limestone have all been used successfully. Each method may have its place. There are such varying conditions of cost and traffic that it appears to be recognized that bituminous treatment of roads is desirable from the points of view of efficiency and economy within a fairly wide range, and limited by intensity of traffic on the one hand and by the present cost of maintenance (representing the antithesis of intense traffic) on the other. There is meantime insufficient information available in Britain to accurately determine the correct method of bituminous treatment to adopt under given conditions; but there is a growing feeling that with the accumulation of sufficient data upon proper lines, such roads may be designed to meet any particular conditions.

Egypt.—A number of methods of bituminous road construction have been tried. The best—indeed remarkable—results have been obtained from the mixing of slag chippings from lead mines and mastic asphalt in the proportion of 3 to 2. Compressed asphalt in the form of natural rock broken to pass a 2-in. ring, and subsequently consolidated to a finished thickness of 3 ins., has also given good results under the climatic and traffic conditions to which it has been subjected.

France.—Surface tarring of ordinary water bound roads is now classic. It is a method which has enabled the highway engineers to counteract in many cases the defects to which the development of motor traffic has given rise. It has been found to appreciably increase the life of roads that have been so treated. Taking one year with another, the services for road works have carried out nearly 4,000,000 square meters of this work; and this is expected to be further increased. The disadvantage found is that it becomes slippery after two or three applications, and that it lasts only for a season. With the increase of traffic to a certain point, it becomes better to use a bituminous binder in complete impregnation.

In discussing these more complete methods of construction with bituminous binder, it is indicated that the method of penetration has been tried extensively and found wanting. Tar macadam, or the mixing method, on the contrary, has been used successfully. In trials made with tar macadam, it appears that the best results have been obtained with the use of tar bound limestone. That, however, has its limits, and apparently the soft limestone is superior only up to a certain point of traffic intensity, for when to a fast traffic a heavy traffic of some magnitude is added, the soft road would be destroyed quickly, and hard road metal then obtains the superiority. It is found that the construction of roads in tar macadam is a satisfactory solution of the problem of construction of roads for motor traffic, where superficial tarring proves to be insufficient and, on the other hand, where the traffic is not too heavy. Within these limits both soft and hard road materials have their place according to the particular case and having regard to the relative magnitude of heavy traffic and fast traffic.

Asphalt macadam has been used in the manner described. It is of recent date and whilst apparently giving satisfaction, time is needed to enable a definite expression of opinion to be offered.

The methods of tar macadam, pitch macadam, asphalt macadam and systems related thereto, will soon offer a whole scale in which the resisting power and the price as well will progressively cross, and in which the engineer will be able to choose the methods of surfacing suitable to the very different circumstances which have to be taken into account in road construction. It is this classification of methods and the exact determination of the amount of confidence to be afforded to them that must now be ascertained. The reporters then advocate a study of the materials and laboratory experiments, and indicate, very rightly, that the field of work is now well defined and that success will result only from methodical and persevering work.

Germany.—A considerable amount of surface tarring has been successfully carried out. The construction of tar macadam roads proceeded apace from 1908 to 1911, and then fell off, apparently on account of the considerable difference in the cost of tar macadam over ordinary macadam, and partly on account of the uncertainty with regard to economic advantages to be gained by its use. Time is needed to ascertain its value, after which it will be decided whether or not and to what extent it will be adopted generally or under specific conditions.

The reporters remark that important facts disclosed between congresses can only be made serviceable and turned to profitable account if the observations are based upon the same principle and according to prearranged system, and such results and observations communicated to other road administrations. Admirable interrogatories have been issued by the German reporters and it is suggested by them that similar ones might with advantage be drawn up and circulated by the Permanent International Association, whereby uniformity would be obtained and results would be considered upon the same basis.

Greece.—Extraordinarily good results are obtained by the use of slag from lead works, which has great hardness and of which the chemical composition and certain physical tests are given. This slag has been used in the form of ordinary macadam surface tarred with tarry and asphaltic substances. It has been successfully used in the form of slag tar macadam, and it has also been used in the construction of asphalt macadam. Speaking of this metal previously tarred, it is said that after 26 months of wear, in spite of intense traffic, the road shows no sign of wear. The reporter goes on to say that the lead slag is unwearable, and that surfaces that are made of it are not dust producers.

Hungary.—The use of surface tarring and internal tarring has had a very short past, but the results have been reasonably successful. Tar macadam roads were not made, however, until the years 1911 and 1912. The reporter indicates that the lives of these tar macadam roads have been too short to enable final judgment to be pronounced. He remarks, however, that their behavior, their low cost of construction and the freedom from dust which results, are rich in promise, and he points out the necessity for the establishment of principles of scientific accuracy from the chemical, geological, technical and mechanical points of view in the building of such roads.

Italy.—The Italian reporter urges the necessity for further scientific research in regard to asphalts and makes certain suggestions with reference thereto. He advocates laboratory tests and their correlation with the actual results of the materials under working conditions.

Russia.—Apparently the condition of the roads referred to by the Russian reporter is not altogether satisfactory for surface tarring. However, such as has been done appears to give favorable results.

Switzerland.—Considerable progress is reported in Switzerland in the use of bituminous binders. It is reported that surface tarring of ordinary macadam roads successfully reduces dust and minimizes wear. When, however, the roads have to carry heavy traffic of great frequency, it is advised to adopt a system of tar macadam in lieu of surface tarring.

At the Congress in 1910 certain important resolutions were passed which have a direct bearing upon the question now under consideration. The most important perhaps was Resolution No. 2, upon the then 5th Question (Choice of the Surfacing Materials), which provided as follows, viz: "Experimental work with macadam improved by using a bituminous or tarry coating or binder must be continued in order to determine the best methods of utilizing this kind of construction under varying conditions."

Other resolutions upon Part 1 of the then 1st Question were also pertinent to this question, e. g.,

The desirability of developing the application of the use of binding materials:

To determine, in each case, the character of the binder best suited to local conditions;

To determine the physical and chemical characteristics to be specified for tar, bituminous, asphaltic or other binders;

To compare the different results obtained in various methods of construction;

To establish the relation between cost and the result obtained.

Under Part III of the same question it was resolved: "That it is desirable, in comparing results, to take into account the quality of the materials composing the metaling, the intensity of traffic and tonnage as well as the climate."

When we have realized the object of Resolution No. 2 above and are able to determine the best methods of bituminous macadam construction under any given conditions of locality, traffic and climate, we shall have achieved the great object of reducing this question to a known science. We are working in that direction but have still a considerable task ahead of us.

It is with some regret that one finds a lack of concerted effort to achieve the desiderata recorded in the resolutions of 1910 and above referred to. In view of the fact that progress must perhaps necessarily be slow, but in full faith that continued progress in this direction is certain, the General Reporter has thought well not to introduce in his suggested resolution upon this general question any particularly new matter, but to content himself with suggesting an amplification of the wishes and opinions as expressed at the last Congress. It is towards achieving the objects sought under the Resolution No. 2 above referred to, that these remarks on the general question will be confined.

One is impressed in reading the reports and on a general study of this question by the general desire to increase the gap which is already separating us in questions of road design from the more or less rule of thumb methods that have dominated in the past.

It is quite possible to obtain a formula or formulae from the accumulation of data upon proper predetermined lines, which will enable one to decide the best and most economical form of construction to meet any conditions of traffic and climate.

As a first step towards effecting this purpose, it is probable that, in the first instance, a series of experimental lengths of road construction would need to be laid down in various and numerous localities and then and thereafter the necessary records should be kept. Subsequently the keeping of some such records would become extended to all important roads and kept by those in charge in the recognized course of their duties.

For intelligent appreciation by all concerned, irrespective of nationality or location, of the results obtained, there must be carefully recorded the conditions at the commencement of the test, viz:

A.—Physical and local conditions;
B.—Specification of what has been done.

Then would be needed a careful record of the factors tending to destroy the road, viz:

C.—Traffic conditions;
D.—Climatic conditions.

These combined forces will operate to produce certain conditions which should be recorded by:

E.—Measurement of wear;
F.—Observations of condition of surface.

Then would also require to be considered the important factor of cost under two headings, viz:

G.—First cost of construction;
H.—Maintenance.

Dealing briefly with the requisite records under these headings, it is suggested:

A.—This information can—at least for the experimental work during the first few years—be most readily provided and appreciated by record upon plan. There should be provided a small scale plan of the locality and longitudinal and cross sections fully written up, and containing notes of the description and depth of foundation and subsoil. There should be added such descriptive notes as may be necessary to record all local conditions—both permanent and occurring during the construction of the works—that may affect results. The rates of labor and costs of haulage should also be recorded. An exaggerated cross section on squared paper should also record, at the points where measurements of wear are ultimately intended, the new finished profile and the foundation upon which the new road surface has been constructed.

B.—There should be submitted a full detailed specification of the method and material of construction employed; together with petrological descriptions of stone and tests of stone and analyses of tar, bitumen, asphalt or other binders used. For the most part the information under this heading could probably be provided by reference to standard methods of construction, tests, descriptions and analyses.

C.—Traffic census, upon prescribed forms, should be taken before the resurfacing, and at such intervals thereafter as may be necessary, having regard to the extent, increase and fluctuation of the traffic. The actual weights would need to be fixed and subsequently certain coefficients determined upon as representing the comparative damaging effects of vehicles per ton upon bituminous bound roads of various forms of construction. These coefficients would require to be adjusted from time to time, as experience might dictate.

D.—Certain observations should be entered daily upon a form of register which it is suggested should be kept.

E.—There should be carefully described the manner in which measurements have to be taken and the provision to be made by way of blocks inserted in the road and by measuring apparatus. One would then need to determine—having regard to the estimated life of the road—the frequency with which these measurements should be taken. This will vary between one and six months and should not be less frequent. Having obtained the measurements, they should at once be plotted upon squared paper.

F.—A description of the condition of the road surface should be given, if possible, every day. Herein there is unfortunately difficulty in eliminating the personal element from the equation and one would need to exercise care in making the comparisons. However, much could be done to unify recorded observation, which should include conditions of slipperiness, muddiness, excessive hardness, softness, dustiness, resistance to traction, etc., under rain, hoar frost, heat, wind, etc.

G and H.—These should be kept in as much detail as possible. A more or less common form of account should be prepared, because all questions of this kind are ultimately reduced to that of cost.

It would not be a difficult matter to draft a complete specimen of the records to be kept, but it is suggested that if the principle is adopted in Congress, the detail of forms, etc., could be left with the Permanent Commission to draft. It would be extremely important that the observations taken and recorded should be comparable. For that reason it would be desirable that standard specifications for construction and binder (more particularly referred to under General Reporter's observations upon sub-heading 4 hereof) be adopted so far as possible and with such variations as might be desirable, and that returns should be made upon prescribed forms with regard to stone tests, traffic census, climatic conditions, measurements of wear and observations of surface condition, and details of cost.

These records will be of the greatest importance to those taking them, and amendments in method of construction, alterations in specified requirements of binder and the most desirable binder for each particular kind of aggregate will be suggested by a careful study of them. In fact, the whole theory of scientific road construction will be built up from a study of such practical results obtained and recorded.

All periodical records and data should be carefully summarized and plotted in the form of curves for the various descriptions of road construction. From these curves, plotted with the traffic as base and with costs as abscissae, there would ultimately be obtained at a glance the points in terms of traffic where each class of road becomes the most economical.

From the information thus obtained, it would be a matter of simplicity to construct a formula from which the most economical form of road construction, under what might be termed normal conditions, could be ascertained for any given conditions of traffic and climate.

Having obtained such indication from the formula, there would, of course, need to be considered any special local conditions such as foundations and subsoil, gradient, and meteorological conditions and composition of units of traffic which were abnormal or required special consideration.

The General Reporter would close his observations upon this general question by suggesting for the consideration of the Congress the following resolutions, viz:

> By the use of tarry, bituminous or asphaltic binders we may obtain a number of different forms of road crust, which may be employed with advantage according to the various conditions of the road as regards traffic, locality and climate.
>
> The exact value and duration of life of these various road crusts, taking into account traffic and climate conditions, remains to be determined.
>
> For this purpose, it is advisable to draw up a uniform system of tests, measurements and records under the following headings:
>
> 1. Physical and local conditions (plans, cross sections, slopes, camber, foundations, subsoil).
> 2. Materials employed; petrological analysis; dimensions; composition of the binding agent.
> 2a. Method of construction. Date of construction.
> 3. Census of traffic on the section under review.
> 4. Climatic conditions affecting the road.
> 5. Periodical measurement of wear.
> 6 Periodical examination of the state of the road crust.
> 7. Actual cost of the road crust.
>   (a) As regards cost of construction:
>   (b) As regards maintenance cost.

1.—Foundations and Drainage

America.—The American reporters consider that a bituminous wearing surface does not preclude the necessity for well drained and adequate foundations. In fact, the improvement of the road by bituminous treatment attracts heavier traffic, which increases the stresses in the foundation. It is further remarked that it should be recognized that road traffic will increase both in amount and severity and in the weight of units.

Britain.—The British reporters point out the necessity for good drainage of subsoil by open jointed pipes, side ditches or other generally accepted methods. They recommend the interposition of a layer of ashes or sand between a clayey subsoil and the foundation; and then proceed to advocate a thoroughly consolidated hand-pitched or other suitable foundation from 6 to 10 ins. in thickness. It is also pointed out that advantage will accrue from utilizing the existing surface of a macadam road as the foundation for a superimposed coating of bituminous bound material.

Germany.—The German reporter remarks that a foundation of 7 to 8 ins. in thickness is of vital importance if tar treated roads are to last for any appreciable time; indeed, it has been settled that for tar or bituminous treated roads a solid foundation 8 ins. thick is absolutely necessary. Efficient drainage of impervious strata is equally necessary, and has proved very beneficial. Tar macadam has usually been laid upon the existing macadam roads which have been used as the foundation. Further strengthening has not been found necessary as the old roads have been thoroughly consolidated and represent considerable strength. Asphalt roads in towns in Germany have, of course, been laid upon a concrete foundation, but have not been adopted in the open country.

Hungary.—The Hungarian reporter considers that good drainage must be beyond question. The main point about a good tar macadam road is a thoroughly firm foundation and substructure. Old macadamized roads have proved very satisfactory as substructures for tar macadam roads. In new roads hand packed foundations 6 ins. thick give good results.

Switzerland.—The Swiss reporters state that the important question of foundations does not receive the attention it deserves. They advocate hand-packed foundations 8 ins. in depth and efficient drainage where required.

The following draft resolution is submitted for consideration, viz:

> Confirming the conclusions adopted in 1910 by the 2d Congress (Brussels, 2d Question), which called attention to the advantages of a dry foundation and a sound subsoil, the Congress especially insists upon the great importance of efficient foundations in the case of road crusts bound with tarry, bituminous or asphaltic binders, for the following reasons:
>
> 1. The road crust being expensive, it is important to give it a base which secures stability.
> 2. As the weight, speed and intensity of the traffic continually tend to increase on roads considered worthy of such a crust, it is best to provide a foundation which has been so constructed as to secure the best possible conditions of resistance to wear.

Consideration of strength of foundation for bituminous bound roads must include upon the one hand the certainty of increased weight, volume and speed of traffic, and upon the other hand the additional power of distributing weight which may be claimed for most forms of bituminous construction.

2.—Sizes and Shapes of Broken Stone for Bituminous Bound Surface Crust

America.—It is found that bituminous surfaces on ordinary macadam roads are best when the macadam road is constructed with metal that will pass a 2¼-in. ring and be retained upon a 1¼-in. ring, but for tar macadam, or bituminous concrete, as it is termed, stone passing a 1¼-inch ring is preferred. It is considered that for the purpose of tar macadam, stone passing a 2-in. screen should be used with caution in the construction of the upper crust, unless the voids are properly reduced, because of the liability of the individual stones to rock under traffic.

When dealing with the grouting method, it is considered that a larger stone may be used with advantage, and a stone passing a 2½-in. ring and retained upon a 1½-in. ring is preferred. It is thought that more uniformity of grouting, together with longer wear, are secured by the use of larger stones within limits and subject to the stone being broken cubically, and having sharp angles, and that the larger stones are better able to withstand crushing under very heavy loads carried upon steel tires.

Austria.—The size of the stone is thought to be an important matter for surface tarring. Where cubical metal of a 2-in. size has been used with sand to fill interstices, the surface tarring has remained good everywhere, but it will fail where the surface is formed with small gravel.

Britain.—Cubical stone is always to be desired. For tar macadam, stone from 2½ to 2 ins., faced with 1½-in. stone and filled in with ¾-in. to ¼-in. metal, applied separately, is advocated. Mixed sizes are deprecated as being difficult to secure uniformity of distribution in the mass. For the grouting method stone of 2 to 2¼ ins. closed with ½-in. or ¾-in. is thought to give the best results.

France.—Cohesion would attain its maximum if care were taken to make the roadway of materials decreasing in size from bottom to top. A veritable division of work apparently is produced between the coarse material which in the main body of the roadway gives it power to resist crushing and the fine metaling of the upper layers which forms the road crust, capable of resisting a high tangential force.

Germany.—For surface tarred roads metal of 1½ ins. to 2¾ ins. has been used. For tar macadam various sizes of stone have been used, the fundamental desire being that the interstices in the metal must be filled as completely as possible, the maximum size of stone being 2½ ins.

Hungary.—Most unsatisfactory results were obtained by the use of river stone, the surfaces being smooth and the geological combination heterogeneous. As a principle it is established that the surfacing must be made with from three to four different sizes or grades, and that the next smaller size or grade in each case must correspond with that of the voids between the next larger, till finally the voids between the smallest grade correspond with the quantity of the binding material.

Switzerland.—For surface work large stone is deprecated. The best results are obtained by a stone which offers to traffic the greatest number of points whilst retaining a cubical shape, and which will pass a ring not greater than 1½ or 2 ins. in diameter.

Specifications of size and shape of stone are required and should be reduced to a common standard. Meantime it is agreed upon all hands that cubically broken stone with sharp angles is most desirable. The size of stone will depend upon the method of construction adopted, and upon the character of the stone used. The following suggestions as a basis for suitable resolutions are submitted for (1) stone to be surface tarred, (2) stone for tar macadam, and (3) stone for grouting.

> 1. When an ordinary macadamized road crust is constructed with a view to being tar-sprayed it should be constructed of hard metal, with sharp edges, and broken as nearly as possible to a cube of the dimensions of from 4 to 6 cm.
>
> 2. In the case of tar, bituminous or asphaltic macadam, carried out by the mixing process, the dimensions of the metal must be so selected and graded as to form a compact road crust with the fewest possible voids. The dimensions of the largest metal may vary according to the nature of the stone and of the traffic. When the process of construction employed requires more than one layer of material, the upper layer or wearing crust must be formed of smaller metal.
>
> 3. In respect of tarry, bituminous or asphaltic road crusts constructed by the penetration process, the trials and tests now being carried out in various countries should be continued, taking care only to employ metal of as cubical a shape as possible, and with sharp edges, at any rate for the portion of the road crust nearest the surface.

3. Use of Partially Worn Materials in Bituminous Bound Surface Crust

America.—The use of this used material is not favored. If carefully separated it may be used for the lower courses in the grouting method, but should not be used for surface work.

Britain.—This material is seldom used. It is too expensive to thoroughly clean, and not really satisfactory when cleaned.

Germany.—Old materials have not been used on the score of economy.

Hungary.—This material, if the dust and dirt be carefully removed, might be re-used.

This, apparently, is not thought to be a question of vital importance. The following resolution is submitted for consideration, viz:

> By carefully eliminating all particles of mud and organic matter, it is possible to successfully make use of partially worn materials, on condition that they are not employed for the surface of the road crust.

4.—Thickness and Composition of the Strength Crust and the Super or Wearing Crust under Different Conditions

America.—It is rightly pointed out that in the determination of the thickness and composition much depends upon local conditions. For bituminous surfacing to existing macadam roads a thin coating is preferred to a thick carpeting, especially where there is heavy horse-drawn traffic. The bituminous concrete surfaces seem to vary from 1½ to 3 ins. in thickness and to be laid upon a broken stone foundation of from 4 to 8 ins. in depth, or upon a cement concrete foundation of from 5 to 6 ins. Heavy rolling prior to grouting is recommended for that method, when a wearing course of pitch grouted macadam, of from 2 to 3 ins. in thickness after consolidating, is usually superimposed upon a bottom course of an average thickness of from 4 to 5 ins. This bottom course is not grouted, but is occasionally covered with a coat of pitch before the application of the wearing course.

Britain.—It is pointed out that the thicknesses of the strength crust and the wearing surface are governed by the conditions of the road, subsoil, position, gradients, volume and character of traffic and other factors, so that it is impossible to lay down hard and fast rules. It has therefore been deemed advisable to indicate various thicknesses which have been found to answer under specific conditions. Various opinions are quoted showing that the thickness of tar-treated material upon suitable foundations is graded with the traffic and other conditions from 2 to 5 ins. Reference is then made to the first report of the Advisory Committee of the Government Road Board upon trial lengths of various forms of construction near London. A short summary of this report is submitted as an appendix to this British report.

Egypt.—The composition and thickness of a number of experimental lengths of road construction are described and discussed with the results obtained.

France.—A considerable number of experimental lengths of bituminous construction are described in detail, and discussed. The various thicknesses and compositions may be considered with the results described. A feature of interest is the established fact that soft material such as limestone gives the greatest satisfaction within the limits of its power of resistance to the crushing effect of heavy vehicles.

Germany.—Surface tarring is applied to existing macadam roads which have a thickness of about 5 ins. It is pointed out that thicknesses vary with the method of construction adopted and a number of examples are given.

For surface tarring and tar macadam harder stones like basalt have proved more suitable than softer kinds like limestone. It is assumed that the harder material is better able to keep its place in the road crust than is the softer material. On the other hand, tar and tar products cling better to the softer stones and are better absorbed by them. It is recommended that hard stones be used exclusively for tar macadam work. The complete filling of interstices is recognized as desirable.

Hungary.—It is customary to spread tar macadam to a thickness of from 2 to 2½ ins. For light traffic 1½ ins. are used; for medium traffic 2½ ins., and for heavy traffic 4 ins. When the thickness exceeds 2½ ins. it should be rolled in two thicknesses, otherwise compression is found to be insufficient.

Switzerland.—For what is termed heavy traffic a minimum thickness of road material of from 12 to 15 ins. is recommended. It is also recommended that a layer of sand or other similar material be interposed between a clayey subsoil and the foundation. Uniformity and hardness in the composition of the road material are recommended as giving greater solidity and better wearing qualities.

It is obvious from closely reading the reports submitted, that the most desirable thickness and composition varies with conditions of locality, subsoil, traffic, materials available, etc. Much more specific data will be required before any general laws can be laid down. This aspect is dealt with in some measure in the draft resolution which follows a review of the general question already submitted.

5.—Life of Surface Crust under Different Conditions of Traffic, Weather, Subsoil, etc.

America.—The life of surface crusts depends upon the materials of construction, the amount and nature of the traffic, the character of the maintenance, and the condition of the foundation and drainage. Continued maintenance and periodically applied seal coats are recommended. Bituminous concrete pavements so treated have an estimated life of 20 to 35 years, when laid upon concrete foundations. Without maintenance the following estimates are given: 4 to 10 years with only broken stone foundation, but with concrete foundation 7 to 15 years.

Britain.—It is pointed out that there are many factors, local, physical, climatic and traffic, which militate against setting up a standard. It is considered by the committee to be unwise to attempt to set up any one general standard for ascertaining the life of country road surfaces, but it is stated that "It is essential to arrive at some general agreement or basis upon which the proportionate effect of various factors upon the life of road surfaces can be ascertained."

France.—Ordinary macadam is increased in life to various extents, sometimes 50 per cent. and often more, by surface tar treatment. This surface tarring is satisfactory so far as it is carried out upon roads which are subjected to a traffic sufficiently light to justify such treatment. When that point is passed the impregnation of the crust materials either by mixing or grouting is resorted to. These methods appear likely to extend the life of the road so treated sufficiently to justify the extra cost involved, but that cannot yet be affirmed as a general principle.

Germany.—Generally speaking, bituminous treatment should be undertaken only in dry, warm weather. Bituminous road construction during rain, fog, wet and cold has been avoided, as such circumstances have tended to a perceptible reduction in the durability of the roads. Surface tarring in very shaded places is not satisfactory and has proven unsuitable for towns and heavy traffic, the maximum traffic permissible being fixed at 350 draft animals, 35 light passenger cars, and 20 heavy motor wagons per day. The effect of volume and weight of traffic upon tar macadam roads has not yet been fixed, but it is already evident that the ill effects of motor traffic upon the durability of macadam roads is somewhat counteracted by tar or bituminous treatment. Indeed, it is ascertained that motor traffic actually improves roads laid with bituminous macadam, as the car wheels help to compress the surface crust.

Greece.—Very considerable increase in life is attributed to the use of lead slag bound with an asphaltic binder.

Hungary.—The period of bituminous construction has been too short to make a declaration. Roads are at present excellent. From observations the authors are inclined to lay it down that the durability of a tar macadam road stands in the inverse proportion to the quantity of water that a tar macadam layer will allow to pass through it. Various experiments made point to the law that the wear of the surface layer is the smaller, the more homogeneous and the stronger the stone used for the metaling.

Switzerland.—The life of surface crust depends upon materials and traffic, variations in temperature, particularly frost and thaws. These variations in temperature are the conditions which show bituminous bound roads to advantage, offering a much longer life and less maintenance. Generally speaking, however, the trials are of too recent date to admit of giving definite comparative figures.

As remarked under sub-heading 4, considerable additional data will be required before one is enabled to express definite opinions under this heading.

Meantime it would appear desirable to take as the standard of life that of the ordinary water bound macadam road. This can usually be obtained from the records of frequency with which the road has been resurfaced. The cost of such resurfacing plus the maintenance costs during the period between resurfacings will then give the total average annual cost. If then the average annual traffic is ascertained from census, one is enabled to fix the cost of road maintenance in terms of pence per ton carried. Then the like figures for the road when bituminous bound, together with an adjustment of the census figures for traffic, will enable one to arrive at an adequate comparison of life and costs per ton of traffic carried.

6.—Relative Importance of Patching, Repairs, and Periodical Renewals of Surface Crust

America.—Frequent patching and the "stitch in time" principle is advocated on the score of economy and efficiency.

Britain.—It is agreed that repairs should be undertaken as soon as holes and depressions appear in the surface crust. In short, a "stitch in time" policy is advocated.

France.—It is desirable that the new coating should not be put on until the old is worn off. The repair should be in patches. It is best to repair patches with tar material at once, for which purpose a type of tricycle carrier is being studied in order to bring the "stitch in time" policy to perfection.

Germany.—In surface tarring the surface should be repaired whenever the natural color of the stones begins to show, or the surface of the road shows signs of working into mud. The renewals of tar macadam have not been settled in Germany. The surface should be continually watched and every damage to top crust repaired. This will reduce the cost of upkeep and add to the safety and comfort of the traffic.

Switzerland.—The "stitch in time" principle is particularly adapted to bituminous bound roads. Patching is recommended so that the road may always be kept in good condition.

There appears to be such unanimity of opinion upon this question, and no counter opinion expressed, that the following resolution is put forward with some confidence that its substance may be found acceptable to the Congress.

> It is agreed that it is absolutely necessary to carry out repairs, in the case of all tarry, bituminous and asphaltic road crusts, immediately the necessity for them arises.

7.—Extent of Wear Permissible Before Renewal of Surface Coating

America.—Report upon heading No. 6 applies equally to this.

Britain.—A reply to this question is dependent upon the character of the foundation. Where the foundation consists of 4 to 6 ins. of old macadam, as in most country roads, it is considered essential that the bituminous bound surface should be renewed before it has been worn away to such an extent as to lose its impervious qualities.

Germany.—Report upon heading No. 6 applies equally to this.

Switzerland.—It is recommended to patch the road before it is damaged to such an extent that the weather and traffic will seriously affect it. As soon as the wearing crust is worn off it should be renewed.

If the construction has been that which may be termed two-coat work, it will be found desirable, having regard to the flattening and irregularity of profile, to the reduction in strength and to the degree of imperviousness—to resurface at a time not much later than when the stone of the lower course is laid bare. If the wear is uneven or is in patches it is necessary to adopt the policy of patching repairs until circumstances necessitate or warrant a complete resurfacing. This question of patching has been dealt with under subheading No. 6.

It will become much more usual to find that the wear is reasonably even, and therefore the following resolution upon this sub-heading is submitted for consideration, viz.:

> The complete renewal rendered necessary by wear must be carried out immediately the depth of the road crust is below a given limit of safety, or when its waterproofing qualities have become so poor that the road will unduly suffer from climatic conditions.

8.—Measurement of Wear and Appliances Used for This Purpose

America.—Work of this character has been very little done, and when done has been by means of accurate elevations.

Britain.—In actual practice detailed measurements are not required. For specific tests it is desirable to take accurate measurements by some such appliance as is indicated in the report.

Germany.—In one instance only straightedge and spirit level were used. Difficulty is pointed out in deciding from levels taken how much of the difference may be due to actual wear, and how much to the compression of the road crust itself. It is suggested that accurate measurements may be made by the amount of dust produced by the traffic. If the quantity of dirt brought on to the road by traffic be deducted from the total amount of sweepings, the remaining difference will represent the amount of dust arising from wear.

Switzerland.—Prickings and cross sections only relied upon from which it is thought that accurate diagrams could be prepared.

From the reports received it would certainly appear premature to suggest any considerable extent of measurement of wear. To a certain extent the amount of metal applied gives a rough index or measurement of wear. It may, however, be agreed that for experimental lengths, for new methods of construction, and for those lengths from which accurate information is required, the accurately measured wear becomes a desirable factor. One would thereby ascertain exactly what had happened, and the amount of wear that was suffered by carrying a known traffic. For such an important purpose one would need to know the exact condition at the commencement of the observations, and the condition at certain subsequent dates; and also the amounts of traffic carried. Without such measurements one would scarcely know that one had not built up the original strength of the road or drawn upon the original strength as the case might be.

There remains the difficulty referred to by the German reporter but perhaps it is not essential to differentiate between wear and compression. If the wear is even and the compression is even, it makes comparatively little difference. It is conceivable that the wear may be even but the compression uneven; but the figures obtained coupled with the cross sections will give a good indication of the combined effect, and really that representing the changed conditions of surface is what is desired to be known.

If and when measurements are required, they will need to be accurately obtained by measuring instruments of which there are three at least in England, designed by Mr. J. A. Brodie, Colonel Crompton and Mr. Maybury, and these could be described if of interest.

The use of the dumpy level for this purpose is found somewhat cumbersome, and scarcely sufficiently accurate to determine the wear of certain classes of construction over short periods.

9.—Various Methods of Bituminous Treatment

A—Mixing Methods: (1) in factories, (2) on the spot.
B—Grouting Methods. C—Carpeting Methods.
D—Other Methods.

America.—It is pointed out that the hand mixing which was in vogue in 1910 is giving place almost entirely to mechanical mixing, either in suitable depots or in portable plants at the roadside. The necessity for uniform heating of the aggregate is mentioned, and the danger that rises from excessive heating. The best practice in America provides for a seal coat, the extension of which is that which is known as the carpeting method. The grouting method as practiced in America is fully described, and deals with aggregate, binder, method of application and all questions of interest in connection therewith.

Austria.—The methods of tar surfacing ordinary macadam and the construction of tar macadam roads are fully described and the results well discussed.

Britain.—The general opinion is that it is more satisfactory to prepare the tarred material at a quarry or depot than at the roadside. It is pointed out that the grouting method has been carried out in accordance with the Road Board specification with satisfactory results. It is desired to emphasize the importance of favorable climatic conditions for entirely satisfactory grouting work, also the necessity for securing accurate and regular distribution of the grouting in actual operations.

The committee is unable to express any opinion about the practicability, cost or durability of the carpeting method, which it describes as consisting of applying a thin layer of bitumen mixed with carefully graded sand, or pitch and oil, to form a wearing crust on a cheaper quality of macadam. It is pointed out that surface tarring is of material assistance in prolonging the life of a water bound road, especially where rapid self-propelled traffic is considerable. It is desired to emphasize the advantage of commencing this class of bituminous treatment as a pioneer method, in order that a greater area may be covered with the funds at disposal.

France.—Tar macadam appears to have been laid with considerable success, and a number of interesting experiments are fully described and some enlightening conclusions are drawn. The experiments in this country have, however, not been happy with regard to grouting, in favor of which there appears to be nothing to be said. Some experiments in this form of construction and their results are described. It is explained, however, that the grouting method should not be abandoned; that it is evidently less perfected than the mixing method. It is thought, however, that lack of homogeneity must result but that it will be less costly than tar macadam.

The method of drying the aggregate by "Well's" heaters before the grouting of the pitch is described, as also is the difficulty experienced in mixing the sand and pitch before grouting.

Germany.—Various proprietary processes are described in detail, as also are the methods adopted and recommended for surface tarring and grouting work. It is generally acknowledged that heating and machine mixing the stones and removing the dust are essential in the preparation of tar macadam. The use of cold tar and cold tar products has been proved to be useless. Distilled tar is now almost exclusively being used.

Hungary.—Specifications are given for proprietary systems. The use of a heatable front roller resulted in the successful construction of a certain length described which requires to be laid hot, and, the materials for which suffer from loss of heat during transit. Surface coating has proved completely satisfactory and the formation of mud and dust has been prevented.

Switzerland.—Various methods are briefly described.

It would serve no useful purpose to submit even in an abridged form the various methods of bituminous treatment referred to. These would number quite 70, varying more or less, and even these do not represent a complete list. Very naturally, there will be no general agreement as to the best method. Some pin their faith to the surface tarring of water bound macadam; some can find no good in the grouting method and greatly prefer the mixing method; some prefer the grouting to the mixing method; some find tar compounds the best binders and others advocate natural asphalts; some prefer limestone and others hard stone; some prefer mixing at a depot and others at the roadside. It is quite evident that there is no one best method, but various methods and materials are right and best under certain conditions, but it appears to make for sound economy to aim at perfecting methods which enable the maximum use to be made of the materials at hand, particularly in using the stone of the country.

10.—Relative Advantages and Use of Tar, Tarry Compounds, Asphalt, Bitumen, and Other Materials

America.—Bituminous concrete pavements have given good results when asphalt with proper physical and chemical properties has been used, as also have refined coal gas and water gas tars, with an asphalt seal coat. Mixtures of tar and asphalt for surfacing of ordinary macadam roads and used for seal coats have given good results. High carbon tar has been found unsuccessful in its use as a seal coat where there is much horse-drawn traffic. In considering the penetration method unrefined tars have been abandoned. The requisites of the tar and tar products used for grouting include a certain amount of light oils for giving the pitch the desired fluidity in handling, and a generous proportion of middle and heavy oils are required to retain the longest possible life and elasticity. A limited amount of "free carbon" is advisable in reducing susceptibility to changes in temperature. A ratio between the free carbon and the heavy oils is advocated. Too little free carbon is found to result in objectionable susceptibility to summer heat; too much free carbon produces too great hardness under extreme cold. It is considered that satisfactory material may be produced by "cut-back" methods. In the use of natural asphalts it is necessary to guard against the lubricating characteristics and to obtain the necessary binding characteristics of the pitch compound.

Austria.—It is considered that the best plan for making macadam roads with tar, bitumen, or asphalt in country districts is to form the road crust with hard broken macadam of about 2 ins. in size bound with sand, and to tar the surface by machinery. This was the opinion expressed by Mr. Bradaczek at the 1910 Congress, and it has been confirmed as the result of his further experience. Specially prepared tar has not been used on account of its high cost.

Britain.—It is pointed out that there are insufficient reliable data to correctly estimate the relative advantages of binders. Surface tarring on ordinary macadam roads with light traffic at a cost of £50 per annum is giving excellent results in preventing dust and prolonging the life of the road. Where traffic is heavier the more expensive interior treatment either in tar macadam or in grouting, with pitch, oils and sand is employed with satisfactory results. The use of natural asphalts and bitumens has not been extended to country roads, the difficulty of manipulation being an objection and the cost a serious obstacle when dealing with a great mileage.

Egypt.—Certain asphaltic mixtures have been found unsatisfactory under the hot climatic conditions of Egypt, whilst certain asphalt work with a given percentage of bitumen appears to have given excellent results.

France.—Tar has been used very successfully and extensively for surface dressing. Trinidad asphalt has recently been tried in lieu of coal tar as a surface coating on ordinary macadam, and is expected to give such results as will justify its cost, but insufficient information is yet to hand. Tar of suitable quality has been used with considerable success in the manufacture of tar macadam, and appears to have given better results than a mixture of pitch and oil. Natural asphalt has also been used in a manner similar to tar and pitch and oil, and it is pointed out that, being more costly, it should give better results, but there is not yet sufficient information to affirm this.

A great number of patented substances have been tried, some of which give promise of success, viz: "Bitulithe," "Dustabato," "Pix Road," and "Tarvia"; "Glutrin," on the other hand, has not effected any prolongation of the life of the road, although as a dust preventive during dry weather it has been used with success.

Germany.—Coal gas tar to comply with specified requirements has been successfully used for surface dressing of ordinary macadam roads, and for construction with tar macadam. Tar compounds and natural asphalts have also been used in the construction of what may be termed bituminous concrete, but insufficient time has elapsed to enable the relative advantages to be specified.

Greece.—Asphalt as a binder used with lead slag has given remarkably good results and is found for this purpose and as used to be greatly superior to tar, as a binding material.

Hungary.—A satisfactory tar macadam road combines all the advantages of the asphalt road without its disadvantages. It is strong, not slippery, and considerably cheaper. In "first parade" streets, however, it will not successfully compete with asphalt surfacing. Neither crude nor distilled tar used as a sole binding material will give a good result. It is thought to need blending—presumably with natural asphalt or similar bitumen—to produce a binding medium which is hard, tough, waterproof and very viscous.

From careful consideration of the opinions expressed by the reporters and from extended use of various binders, we do not feel that the relative advantages can be adequately considered without full knowledge of the conditions of each case. For the time being it appears probable that the binders will generally be found useful somewhat in the following ways, viz:

For surface dressing of macadam roads: Dehydrated coal or water gas tar applied by machinery.

For surface dressing of tar macadam and kindred road crusts: Asphalt or pitch or a mixture of both with or without an admixture of sand, and applied by squeegees.

For tar macadam with limestone or slag or similar material as aggregate: Distilled tar.

For asphalt macadam: Natural asphalt or suitable residual from distillation of oil of an asphaltic base.

For grouted macadam with whinstone, granite or trap rock: Pitch and oils with or without an admixture of sand.

All tar, oil, pitch, asphalt, oil residual, etc., will need to comply with requirements which already our knowledge of these materials allows us to specify with some accuracy.

The various fields of greatest usefulness of such binders can, it is suggested, best be determined from consideration of recorded information upon some such lines as are suggested in the notes upon the general question.

11.—Tests and Chemical Analysis of Tarry, Bituminous, and Asphaltic Compounds

America.—The complex and varying nature of the bituminous road materials is already recognized by the leading highway engineers and as a logical sequence they recognize the necessity for systematic testing and analysis. It is pointed out that tests rightly applied to one class of binder may be inapplicable to another; and that results obtained are not always subject to the same interpretation, when applied to different materials, such, for instance, as tar and asphalt.

The more common tests applied at present to bituminous materials are briefly described and the purpose of the tests is lightly touched upon. In the short space allotted to Mr. Prevost Hubbard it has been impossible for him to discuss the relative and actual values of the tests commonly applied in America.

He points out here that the purposes of testing bituminous road material are identification, control during manufacture, compliance with specification, and research investigations. He also very properly points out various factors which should govern the selection of a road binder, mentioning the purpose for which it is to be used, the proposed method of use, the character of the aggregate, traffic and climatic conditions, and costs of binding materials.

Britain.—It is found that the Road Board specifications are adopted in many instances, but in the large majority of cases no tests are made. It is urged that the Road Board should institute a central testing laboratory. The observations of Mr. Butterfield, F. I. C., are then submitted. Briefly he indicates the purpose of the tests as being: To ascertain that the material possesses the requisite consistency, cohesiveness and adhesiveness, and to estimate the probable effect of time and the elements. He also indicates the important use of recording the results of analysis in order to deduce from the results of use under actual working conditions, which are the desired qualities and which are otherwise in the various binders.

Specifications are drawn up for the various grades of binder in accordance with facts and information that has already been established as the result of such correlation.

France.—Bituminous materials used in road construction have not been subjected extensively to testing. It is agreed that tests of tar and pitch as applied to roads would give interesting information, and the desirability of standardization in this respect is appreciated. Asphalts have received some measure of consideration from the point of view of testing and have occasionally been analyzed for density, bitumen, melting point, volatilization, flash point, and viscosity.

These examinations of asphalts have been made at the Ecole des Ponts et Chaussées since 1911, where they have accepted the program of tests provisionally adopted by the Commission of the Permanent International Association of Road Congresses.

Germany.—It has been demonstrated that the success of tar bound road work depends upon the chemical composition of the tar. It is thought that much of the failure in tar treatment has been due to unsuitable tar which would have been avoided if such materials had been obtained in accordance with certain specifications submitted. These specifications include tar for surface work, pitch and oil for tar macadam, and a petroleum residual with which, however, only one experiment has been made. The specifications are very similar to those of America and Britain.

It is agreed that the greatest advantage would accrue from adopting principles and methods in common and in prearranging a system of record.

Hungary.—The tests found desirable at present are the determination of the softening point, the compressive strength and the tensile strength of the binders.

Italy.—Mr. Torri laments our limited knowledge of the chemistry of asphalt. He discusses different methods of determining bitumens, penetration tests, tension tests and drop point.

It is urged that asphalt is one of the few paving materials which lends itself to be judged by laboratory tests. It is also pointed out that we have an insufficient number of tests, and that we shall need to make real progress by the correlation of laboratory tests with the behavior of the materials under service conditions.

It appears evident that it is now being generally recognized that the testing and analysis of tars, asphalt, and all bituminous binders are of the very first importance. By careful record of the composition of binders and by laboratory experiments correlated with the results obtained under service conditions—incomplete though they be—we are already enabled to specify with some advantage tar and asphalt in various grades to meet various methods of construction and materials used, and climatic and traffic conditions to be encountered. It is already known to some extent which constituent parts are helpful and which are harmful, and the expansion of our knowledge in this direction is becoming to be recognized as an absolute necessity.

There are considerable variations even in those binders which fall within the same generic term. Specifications, even in the same country, for binding materials falling within one category cannot be unvaryingly adopted, as their suitability will be determined by the local production and by the use to which the binder is to be put. Universally and for all classes of binders, one specification or, at present, one set of specifications is impossible to meet all requirements. We must therefore proceed in stages and provide firstly for universal standardization of form, method, and record, leaving reasonable latitude for adjustment to meet local conditions.

It is well that so far as possible specifications for binding materials should be strictly comparable in order that recorded conditions of wear may be readily considered—irrespective of locality—in full appreciation of the materials used. Recording, too, will become a much less cumbersome operation if one needs merely to refer to the bituminous binder as complying with a certain recognized specification —with or without modification—in lieu of having to set forth the specification in detail each time or being unable technically to specify the material at all.

In due course standard specifications and standard methods will be required for all recognized road binders, including not only tar and asphalt, but petroleum residuals, mixtures of tar with petroleum residuals or asphalts, and other combinations.

Meantime, however, proceeding in steps, it is suggested that the first and that which would make for greatest progress would be to standardize the requirements of tar and asphalt, which, up to the present, are the binders by far the most used. In this it is thought there should not be difficulty, as the recognized analyses generally include:

For Asphalt: Specific gravity, viscosity, penetration, melting point, flash point, volatilization, total bitumen, fixed carbon.

For Tar: Specific gravity, freedom from water and ammoniacal liquors, phenol bodies, naphthalene, free carbon, fractional distillation, volatilization, penetration.

Other headings regarding the source of supply, etc., are also required. Specifications for pitch and oils will follow similar lines.

Even if full agreement upon the form cannot be obtained at once, the form so far as universally agreed upon should be taken as the basis and the remaining items added to meet the requirements of each particular country or locality.

When the form has been standardized as far as possible it is necessary—very necessary—to standardize the methods of analysis or determination, as otherwise results may not be strictly comparable. It is not anticipated that there should be much difficulty in this connection. At least the bulk of the methods of determination will be readily agreed, and where otherwise it would be indicated.

All that would be so much to the good but it would not for long be sufficient.

All the tests enumerated above are excellent in their way but they are mostly inferential and not positive. As Major Crosby has previously remarked, the first duty of a binder is to bind. Various tests for the qualities of adhesion and cohesion have been suggested, but have not received the close attention deserved. It appears reasonable to presume, however, that as our knowledge of the subject develops there will be evolved physical tests of a positive nature with regard to the binding properties, upon which great reliance can be placed.

Having regard to the almost universally expressed desire for greater detailed information and the necessity for reasonably standardized methods and materials of construction, it is suggested that a suitable step in advance would be taken meantime in the adoption by the Congress of some resolution which would include the following principles, viz.:

> The advantages of analysis and methodical laboratory tests and their necessity in the case of bituminous binders are unanimously recognized.
>
> It would be of advantage to obtain uniformity:
>
> 1.—As regards the specifications of the principal characteristics of these binders.
>
> 2.—As regards the methods of testing.

12.—Climatic Effects Causing Slipperiness of the Roadway; Remedies

America.—In some cases where seal coats have been used slippery conditions have arisen in cold weather. Application of chips or pea gravel is recommended as a remedy. It would appear that the grouting method produces a surface that is less slippery and unless a flush coat is added would not seem to require the application of remedies for slipperiness.

Britain.—Any impervious surface becomes somewhat slippery at times of hoar frost, light rains, and general humidity. Cleansing and sprinkling with sand or chippings are advocated. Upon steep hills it is recommended to omit the tar treatment entirely upon the near side descending.

France.—After two or three applications of surface tarring a really slippery varnish is formed which is not without danger for animal-drawn vehicles in spite of superficial sanding.

Germany.—Slippery conditions have been noticed during frosty weather and have been rectified by spreading grit.

Hungary.—If properly arranged tar macadam need not be slippery because the larger stones imbedded in the binding material leave it rough. The general public desires a very smooth surface, which is not thought desirable.

Switzerland.—Rain and changes in temperature, particularly at sunrise, cause slipperiness. The disadvantage of slipperiness disappears in great measure when roads are metaled with tarry, bituminous or asphaltic binding materials.

It appears to be generally agreed that certain tarry, bituminous or asphaltic road crusts (as is also usually the case with all smooth and waterproof road surfaces) may become slippery under certain conditions of weather.

This may be remedied by strewing the surface with coarse, sharp sand; and in most cases a good cleansing of the surface will usually prevent the carriageway becoming slippery.

13.—Effect on Public Health, Fish Life, or Vegetation

America.—The effect of using bituminous surfaces has been beneficial from all these standpoints. The odors of certain asphalt oils are obnoxious. American practice has not yet shown that any of the materials used in connection with bituminous surfaces are injurious to public health, fish life, or vegetation, when properly selected and used.

Britain.—There is an unanimous opinion that benefit to health accrues. This is indorsed by medical officers of health. No actual instances of injury to fish life or vegetation have been observed. It is believed that when distilled tar is used no injury is likely to be caused. Hygienically it is an advantage on account of the diminution in dust and mud. At the same time the non-absorbent surface leaves horse manure and vegetable debris free play. In dust abatement coal tar or asphalt is equally satisfactory. Dust from tar or pitch is more irritating to the eyes and skin than disintegrated asphalt. This can be avoided by periodically refreshing or renewing the surface, whereby the formation of pitch dust is prevented. Tar has disinfecting and germicidal qualities. There is a strong smell from freshly tarred surfaces and from some asphalt surfaces by volatilization in the hot weather which may also slightly irritate the eyes.

Egypt.—Mr. Alfred Lucas, Chemist to the Egyptian Government, states that in a case that he was called upon to investigate he found that crops had not suffered from noxious fumes escaping from the tar during its preparation in the vicinity prior to the operation of tarring, nor during the operation, nor from fumes or dust coming from the tar after the operation; that the damage was not due to tar, but to natural causes which he was able to trace to the attack of insect pests. He considers that tar may be harmful to plants under certain circumstances, because it generally contains substances which would be poisonous if brought into contact with the plant roots; but by using a purified tar from which the greater part of these poisonous bodies had been removed, this would be avoided.

Germany.—Fumes from open caldrons have affected the eyes and skin of attendant workmen. Public health or fish life have not been affected in any way. It is found advisable not to bring the surface tarring nearer than one meter to trees and bushes, as the tarring made the crust hard and watertight.

Hungary.—The bituminous bound surfaces have exercised no detrimental influences in a hygienic respect nor affected vegetation.

Switzerland.—No complaints whatever as regards public health and fish life. As regards its influence on vegetation, especially on rows of trees alongside of the road, opinion is divided. Surface tarring has been applied in various avenue roads without the trees having suffered from the process.

It is now common knowledge that there results a considerable diminution of dust by the use of bituminous binders. It is considered an additional advantage that tar and kindred substances have disinfecting and germicidal qualities. It is also obvious that the non-absorbent character of the surface will weigh considerably in the balance in procuring more hygienic conditions. All this is so much to the good.

There are in this connection possible disadvantages, which may be summarized thus:

(a) Tendency to injure roadside trees by waterproofing the surface too close around the bole.

(b) Unpleasant odor during operation and subsequently from certain volatile oils during warm weather.

(c) Danger to fish life if ammonia and phenols are not reasonably excluded.

(d) The non-absorbent surface leaves manure and vegetable debris free play.

(e) Dust produced from tar and asphalt surfaces is more irritating to eyes, nostrils, throat and skin.

Considering the disadvantages submitted it is obvious that there is very little serious objection to be raised.

(a) The soil around the trees should not, and certainly need not, be waterproofed by tar to the detriment of the roots.

(b) The odor at time of application—if objectionable—is certainly of short duration, and the subsequent odor from volatile oils is only occasional and of gradually declining severity.

(c) The danger to fish life can be and should be positively averted.

(d) The particles of manure and vegetable debris will be somewhat heavier from contact with tarred surfaces, but the surface drying more quickly and offering less frictional resistance may allow the dust to rise more readily under the influence of wind.

(e) The additionally irritating nature of the dust is more than compensated for by its reduction in amount, and by the selection of low carbon tar can be considerably reduced.

In short, it is suggested that the following resolution might be considered by the Congress, viz:

> That sufficient information is now available to enable one to select and specify bituminous binders which will have no prejudicial effect upon public health, fish life, or vegetation, but which, on the contrary, will conduce to conditions of considerable hygienic advantage.

14.—Specification of the Methods of Construction

It is not thought that any useful purpose would be served by comment—such as would be possible in this review—upon the specifications of methods of construction which have been submitted in detail or to which reference is made. No fewer than about 70 specifications are thus submitted or referred to. Many of them are very similar in principle but differ in detail. Enlightening comments and explanations are offered; but it is thought that the greatest value will be obtainable from a consideration of the specifications with all the accumulated data of details and results as dealt with in the review of the general question.

15.—Cost Data

Various costs are submitted as applying to specified methods of treatment, materials adopted and local conditions applying. Generally speaking, there are indications that a more extended knowledge of the subject, greater proficiency in practice, and improved appliances will reduce the cost of construction.

There are obvious difficulties in considering this most important question of costs without all the factors governing the particular case under consideration. The first cost is not necessarily of the greatest importance. The cost of reconstruction or resurfacing, and the periods between the resurfacing operations, and the cost of maintenance during these periods, are the important factors from which the cost per ton carried may be deduced.

16.—Cleansing and Watering

There are no other opinions expressed than those which indicate that advantages accrue under this heading by the adoption of bituminous treatment. The surfaces remain practically free from dust, scavenging being reduced practically to the removal of horse manure. Considerable economies are effected both in scavenging and watering.

So unanimous are opinions upon this matter that the following resolution is submitted with some confidence in its acceptance, viz:

> . It is recognized that carriage-ways properly treated with tarry, bituminous or asphaltic materials require less sweeping and watering than ordinary water bound macadamized roads, and that they allow of considerable economy being effected under this head.

We think well to group together below, the resolutions which are disseminated in the course of this report.[*]

General Conclusions

By the use of tarry, bituminous or asphaltic binders we may obtain a number of different forms of road crust, which may be employed with advantage according to the various conditions of the road as regards traffic, locality and climate.

The exact value and duration of life of these various road crusts, taking into account traffic and climate conditions, remain to be determined.[1]

For this purpose, it is advisable to draw up an uniform system of tests, measurements and records under the following headings:

1. Physical and local conditions (Plans, cross section, slopes, camber, foundations, subsoil).
2. Materials employed. Petrological analysis. Dimensions. Composition of the binding agent.
2a. Method of construction. Date of construction.
3. Census of traffic on the section under review.
4. Climatic conditions affecting the road.
5. Periodical measurement of wear.
6. Periodical examination of the state of the road crust.
7. Actual cost of the road crust.
   (a) As regards cost of construction;
   (b) As regards maintenance cost.[2]

Particular Conclusions

Foundations and Drainage.—Confirming the conclusions adopted in 1910 by the 2nd Congress (Brussels, 2nd Question), which called attention to the advantages of a dry foundation and a sound subsoil, the Congress especially insists upon the great importance of efficient foundations in the case of road crusts bound with tarry, bituminous or asphaltic binders, for the following reasons:

1. The road crust being expensive, it is important to give it a base which secures stability.[3]
2. As the weight, speed and intensity of the traffic continually tend to increase on roads considered worthy of such a crust, it is best to provide a foundation which has been so constructed as to secure the best possible conditions of resistance to wear.

Sizes and Shapes of Broken Stone for Bituminous Bound Surface Crust.—1. When an ordinary macadamized road crust is constructed with a view to being tar-sprayed, it should be constructed of hard metal, with sharp edges, and broken as nearly as possible to a cube of the dimensions of from 4 to 6 cm.

2. In the case of tar, bituminous or asphaltic macadam, carried out by the mixing process, the dimensions of the metal must be so selected[4] and graded as to form a compact road crust with the fewest possible voids. The dimensions of the largest metal may vary according to the nature of the stone and of the traffic. When the process of construction employed requires more than one layer of material, the upper layer or wearing crust must be formed of smaller metal.

3. In respect of tarry, bituminous or asphaltic road crusts constructed by the penetration process, the trials and tests now being carried out in various countries should be continued, taking care only to employ metal of as cubical a shape as possible, and with sharp edges,

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[*] The conclusions adopted at the final session of the congress were printed in "Good Roads" for August 2, 1913—those for the Third Question—on pages 50, 51 and 52. The numbers in the conclusions presented by Mr. Smith refer to footnotes, in which the changes, elisions and additions made by the Congress at the final meeting are indicated. Most of the changes were merely in phraseology, such, for instance, as the changing of the expression "tarry, bituminous or asphaltic" to "bituminous, including tarry or asphaltic." These changes are not noted in all cases as they do not affect the sense of the conclusions.—Ed.

(1) The final conclusions read: "taking into account traffic, climatic conditions and the methods of construction remain to be determined."

(2) The following paragraph added in the final conclusions: "The standard form in which the information is to be furnished will be drawn up by the Permanent Commission."

(3) Changed to "a base which increases its life."

(4) In the final conclusions, "may be so selected."

at any rate for the portion of the road crust nearest the surface.[5]

Use of Partially Worn Materials in Bituminous Bound Surface Crust.—By carefully eliminating all particles of mud and organic matter, it is possible to successfully make use of partially worn materials, on condition that they are not employed for the surface of the road crust.

Relative Importance of Patching, Repairs and Periodical Renewals of Surface Crust.[6]—It is agreed that it is absolutely necessary to carry out repairs, in the case of all tarry, bituminous and asphaltic road crusts, immediately the necessity for them arises.

Extent of Wear Permissible Before Renewal of Surface Coating.—The complete renewal rendered necessary by wear must be carried out immediately the depth of the road crust is below a given limit of safety, or when its waterproofing qualities have become so poor that the road will unduly suffer from climatic conditions.[7]

Tests and Chemical Analysis of Tarry, Bituminous and Asphaltic Compounds.—The advantages of analysis and methodical laboratory tests and their necessity in the case of bituminous binders are unanimously recognized.

It would be of advantage to obtain uniformity:

1. As regards the specifications of the principal characteristics of these binders.
2. As regards the methods of testing.[8]

Climatic Effects Causing Slipperiness of the Roadway. Remedies.[9]—It appears to be generally agreed that certain tarry, bituminous or asphaltic road crusts (as is also usually the case with all smooth and waterproof road surfaces) may become slippery under certain conditions of weather.

This may be remedied by strewing the surface with coarse, sharp sand; and in most cases a good cleansing of the surface will usually prevent the carriage-way becoming slippery.

Effects on Public Health, Fish Life or Vegetation.[10]—Sufficient information is now available to enable engineers to select and specify bituminous binders which will have no prejudicial effect upon public health, fish life or vegetation; but which, on the contrary, will conduce to conditions of considerable hygienic advantage.

Cleansing and Watering.—It is recognized that carriageways properly treated with tarry, bituminous or asphaltic materials require less sweeping and watering than ordinary water bound macadamized roads, and that they allow of considerable economy being effected under this head.[11]

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(5) The following paragraph added in the final conclusions.

"4. It is understood that further experiments will also be carried out in the use of other methods and especially those referred to in paragraphs (1) and (2)."

(6) In the final conclusions, "relative importance of patching."

(7) The following paragraphs added in the final conclusions:

"Various means of employing tarry, bituminous and asphaltic material.

"In using this material both in the penetration method and the mixing method.

"(a) It is preferable to use dry stone in order that it may adhere well to the binder. In the mixing method the stone must always be dry and if necessary it must be heated.

"(b) One must never lay a top crust upon a soft or damp foundation. One should preferably carry out the work in fine weather.

"(c) One must never employ too much binder, but only a sufficient quantity to bind the portion of the road which is being rolled.

"(d) One must never employ road rollers which are too heavy."

(8) In the final conclusions paragraph No. 2 reads as follows: "As regards the methods of testing for drawing up these specifications. The Permanent International Commission will be intrusted with the work of inquiring into the best way of standardizing the above."

(9) In the final conclusions, "climatic effects."

(10) In the final conclusions, "effects the public health, etc."

(11) The following was added to the final conclusions:

"The meeting puts forward the following additional proposals:

"That an International Technical Committee should be appointed by the Permanent International Commission in order to study a standard method of obtaining information and data upon materials, physical conditions, local conditions, methods of construction, terminology and other points concerning macadam bound with tarry, bituminous or asphaltic binders.

"The report of the committee should after examination by the Permanent Commission, be presented to a next congress."

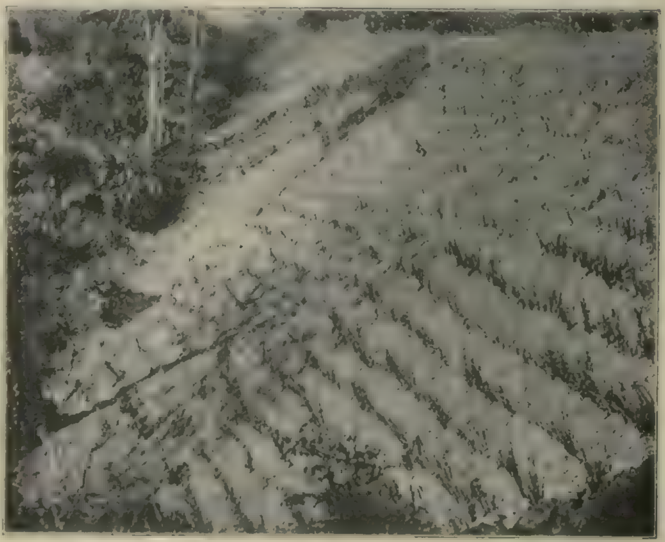
Embankment Protection on a Philippine Road

A somewhat novel method of embankment protection employed on a road in the island of Luzon is shown in the accompanying illustration.

The fill, one side slope of which is shown, is on what is known as the Gual Hill diversion on the Lingayen-Alaminos Road, Pangasinan Province. It carries the roadway across a ravine and, according to the "Quarterly Bulletin" of the Philippine Bureau of Public Works, is "the highest road fill in the Islands as reported to date." The length of the fill on top is 57 meters (about 187 ft.) and its height is 12 meters (about 39 ft.).

The embankment was built of a rather finely divided white clay that did not consolidate readily, and although the top was well protected by the road surfacing, gullies 6 ft. deep were cut in the slopes by the small streams running off the road. The work was not completed until just before the beginning of the 1912 rainy season and the fill suffered considerably. There was not time for sod protection to take root before hard rains were to be expected and recourse was had, therefore, to a thatch of cogon grass.

This is a perennial grass, common in the Philippine Islands and southeastern Asia, which has such a rank growth that it smothers all other vegetation. It attains a height of from 3 to 5 ft. and has high and narrow panicals of a silvery, silky nature.



EMBANKMENT PROTECTION OF COGON GRASS ON A PHILIPPINE ROAD.

The grass was cut as long as possible, generally about 4½ ft., and brought to the work in bundles about 2 ins. in diameter. These were laid close together in longitudinal rows along the slopes with the butts pointing uphill. The rows were placed about 20 ins. apart, and each bundle of grass was pegged down with a short bamboo hook driven into the ground, no other fastening being used.

It is reported that the thatch proved entirely satisfactory, as there was no sign of wash on the embankment under the heavy rains that came later in the season.

The Albany County, N. Y., Board of Supervisors has approved plans for a boulevard connecting the Delaware Ave. section of the city of Albany with a river road leading into the south end of the city, known as the Bethlehem Rd. The new boulevard will start at Van Vetchen Rd. near Delaware Ave., pass between Graceland Cemetery and Kenwood Convent, connecting with the Bethlehem Rd. near its junction with the Old Stone Rd. The plans provide for the construction of a viaduct over the Normanskill at an estimated cost of approximately $100,000.

Economic Results of Surface Tarring*

By Dr. E. GUGLIELMINETTI†

On the occasion of the First International Road Congress I had the honor of drawing the attention of engineers to the advantages of surface tarring of roads, the results of which I had published as far back as 1902.

According to the conclusions of the Brussels congress: "Surface tarring may now be definitely considered as a practical method."

If the advantage of surface tarring from the dust point of view, that is, from an hygienic point of view, is no longer questionable, are we in a position today to express any opinion on it from an economic point of view? This is a much more difficult question to decide, owing to the number of factors which enter into consideration when one is estimating the annual cost of maintenance of any particular kind of road, the intensity and class of traffic being subject to variation from time to time, etc. Generally, all experts agree on the effect of surface tarring in reducing the wear on the road, which necessarily lasts longer, without speaking of the considerable economy in cleaning (sweeping, scraping, watering, etc.).

For instance, in the Seine Department where the roads are resurfaced every three years, it is reckoned that they will last for from one year to eighteen months longer when they are surface tarred.

At Monaco-town, Chief Road Engineer Curti has found an economy of 40 per cent. on roads with small traffic, and 25 per cent. on roads with medium traffic, during a period of experiment spread over ten years. He has not been able to arrive at any conclusion for roads with intense traffic, as they were so often being taken up.

Mr. Bourre, Chief Road Engineer of the town of Nice, where tarring was adopted about the same time as at Monaco, namely in 1902, has just sent me a very favorable report regarding the economy of tarring, from which I cull the following:

"Our inquiry chiefly bore on the Promenade des Anglais, which, being well exposed to the air and sun and used exclusively for pleasure traffic, may be taken as a test case. The macadamized surface of the Promenade des Anglais between the Promenade Jetty and the Magnan Bridge, is about 12,000 sq. m.

"Before tar was used the road department was compelled to renew the road surface each year at the divers points, which represented about 4,000 sq. m. of resurfacing or 1/3 of the total area.

"Since tarring was adopted, the areas requiring renewal only represent about 2,400 sq. m. or 1/5 of the total area.

"This represents a saving of 1/3 — 1/5 = 2/15 of the total area.

"The effect in reducing the dust is most satisfactory, and the general appearance of this pleasure road is much improved.

"The cost of removing mud has also been considerably reduced. As to the cost of watering, no alteration has occurred, as it is still necessary to remove the dust which is brought on to the road.

"We may add that the saving on the costs of maintenance almost compensates for the cost of tarring.

"Conclusion.—Tarring appreciably improves the roads, and does not entail extra expense.

Tarring costs, at Nice:

2 coats (1.8 k. per sq. m.)	0 fr. 20
1 coat (1.0 k. per sq. m.)	0 fr. 15
plus extras for washing, sanding, supervision, etc., per sq. m.	0 fr. 05

"Where tarring is really of great advantage is in side alleys, squares, etc., which are exclusively required for pedestrians.

"The surface is tarred every two years, upkeep by sanding has been abandoned, and the road surface is almost perfect.

"Generally speaking one may say that surface tarring is effective on macadamized roads which are well exposed, well kept up, and not subjected to the traffic of heavy vehicles.

"On other roads the result is meager, because the tar on the surface is soon broken up by the traffic, and after watering and rain it forms a kind of black, sticky mud which is very objectionable and gives rise to complaints from the public.

"Notwithstanding this undoubted objection we consider that even in this case tarring is desirable, for it assists the consolidation of the materials of the road crust which otherwise tend to disintegrate through the action of water, because the material now used for macadamized roads is of a gravelly nature, and consequently its binding properties are feeble.

"But the complaints of the public, who would not be backward in blaming the road department, compel one with regret to abandon tarring methods for roads of this kind."

The Promenade Des Anglais at Nice, referred to by Mr. Bourre, is subject to practically the same traffic conditions as the Avenue du Bois de Boulogne in Paris, and for this reason it may be interesting to compare Mr. Bourre's report with the report of Mr. Bret, Chief Works Engineer of the city of Paris, dated the end of November, 1912:

"Before surface tarring was adopted the roads were resurfaced every 3 or 3½ years. The condition of the road became bad the first year after the road was resurfaced.

"During the last period the costs were as follows:

1903—Resurfacing in March	118,779 frs.
1904—Maintenance repairs	26,481 "
1905—Maintenance repairs	32,657 "
1906—Maintenance repairs (before resurfacing in September)	1,218 "
	179,135 frs

"Or an average of:

$$\frac{179{,}135 \text{ frs.}}{25{,}580 \text{x} 3.5} = 2 \text{ frs. per sq. m. per annum.}$$

"In the following years, the costs were modified as follows:

Resurfacing in September, 1906		97,482 frs.
1907—Maintenance repairs	2,977 frs.	
Tarring in May	3,860 "	6,837 "
1908—Maintenance repairs	9,151 "	
Tarring in April	5,539 "	
Tarring in September	3,146 "	17,836 "
1909—Maintenance repairs	12,998 "	
Tarring in April	4,716 "	
Tarring in September	4,542 "	22,256 "
1910—Maintenance repairs	6,635 "	
Tarring in April	5,395 "	
Tarring in September	4,528 "	16,558 "
1911—Maintenance repairs	16,687 "	
Tarring in April and in September	10,814 "	27,501 "
1912—Maintenance repairs	8,050 "	
Tarring (repairs in April)	1,080 "	
Tarring in September	5,700 "	14,830 "

"During the period of 6 years which has just elapsed the total costs amounted 203,300 frs. or an annual average per sq. m. of—

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*Paper presented at the Third International Road Congress, London, England, June 23-28, 1913; Section I—Construction and Maintenance; Communication 4, Technical and Economic Study of the Comparative Advantages of Different Types of Roads.

†Secretary, Anti-Dust League, Monte Carlo, Monaco.

$$\frac{203.300 \text{ frs.}}{25.580 \text{x} 6} = 1.32 \text{ frs.}$$

"The road has been maintained in excellent condition up to the present.

"As an experiment, we laid a bitulithic surface last month on an area of about 3,200 sq. m. on two very prominent sections of the avenue. This bitulithic surface is a kind of bituminous concrete with porphyritic materials laid 5 cm. thick for which the municipality pays 2 frs. per annum (construction and maintenance)."

Conclusions.—We generally find from the reports of experts that surface tarring does not give such appreciable results on metaled roads with heavy vehicles and intense traffic as on metaled roads with a moderate traffic. The reason for this is that the metaled road itself does not wear well under heavy vehicles and intense traffic, and in order that the tar may hold well the substratum on which it is applied, that is the top crust, must hold together. If this crust gives, the tar will follow. In order, therefore, to obtain good results it is not only necessary to adopt a good system of surface tarring but the roads on which it is done must be selected judiciously.

An indifferent choice of roads is probably the reason of the numerous failures which occurred in surface tarring when this method was first introduced. The municipal engineers, pressed by the complaints of householders regarding the dust, and not having adequate funds for converting these metaled roads with heavy and intense traffic into paved roads, proceeded to tar them on the surface in the expectation that this would give the desired results. They were, however, under a complete misapprehension, as these roads could not be improved by surface tarring.

A metaled road which, owing to the class and intensity of its traffic requires resurfacing every two years or oftener, cannot be improved in any degree by surface tarring. The most logical means of saving such roads and avoiding the dust, is to pave them until we have definite results of those experiments which are now being carried out with the various methods of incorporating the tar into the construction of the road itself (tar macadam, quartzite, bitulithic, etc.), which are less costly than paving, and would probably be very suitable for a great number of roads with heavy traffic. Surface tarring properly applied can therefore only give very appreciably satisfactory results from an hygienic point of view as well as from an economic point of view, on roads which by the very nature and intensity of their traffic may remain macadamized; that is, those which only require to be resurfaced every three years or even less frequently.

It is not only necessary to inquire how to tar but also to ascertain which are the roads to be tarred. In this connection we may safely affirm that surface tarring, whilst it appreciably improves the roads, in no way entails additional cost, but can under certain conditions effect a very pronounced saving.

New Highway Laws in Arizona

Four new laws pertaining to highway administration were enacted at the recent session of the Legislature of Arizona.

One of these measures, approved May 15 authorizes the employment of state prisoners upon the public highways and bridges of the state, under the direction of the State Board of Control. The work done under the provisions of this law, which includes maintenance and repairs, must comform to the orders and specifications of the State Engineer. Convicts can be employed only upon request by the supervisors of the counties in which the work is to be done.

The State Board of Control is directed to purchase and deliver, from time to time, at whatever locality prison labor is to be employed, the necessary tools, machinery and supplies, and to provide shelter and subsistence for the prisoners while employed. The law provides for the establishment and maintenance, by the State Engineer, of camps and enclosures for prisoners employed on the roads. The State Engineer is also empowered, subject to the approval of the State Board of Control, to establish rules and regulations governing the conduct of the prisoners engaged in highway work.

The measure directs that the cost of transporting prisoners and their guards between the state prison and the location of the work or from one location to another, establishing and maintaining camps, the subsistence of the prisoners and guards, the purchase and repair and maintenance of machinery, tools and equipment, the purchase and subsistence of animals used in connection with convict labor on the roads and all other necessary expenses in connection therewith be paid as follows: That proportion equalling the maintenance cost at the state prison for the number of prisoners employed must be paid from the prison maintenance fund, the remainder must be taken from the state road tax fund of the counties in which the work is done, except in the case of the cost of tools, equipment, machinery and animals, which must be paid out of the general fund of the state Claims for payment must be approved by the State Engineer, and audited by the State Auditor.

The law appropriates a sufficient sum out of the general fund, the prison maintenance fund, and the state road tax fund, to carry out the provisions of the act for the fiscal years ending June, 1914, and June, 1915. The law will become effective August 15 of this year.

A second law authorizes the state to advance to any county a sum not exceeding $20,000 for any one county, for the purpose of constructing bridges. In order to obtain this fund, the board of supervisors of any county desiring to take advantage of the law must adopt a resolution directing that application be made to the State Board of Control, and authorizing the chairman and the clerk of the board to make such application in writing. The funds are advanced upon receipts of the application at the discretion of the Board of Control. The State Treasurer is required to keep a separate account of all funds thus advanced to any county and to reimburse the state whenever money is received in the state treasury to the credit of the 75 per cent. of the state road fund which legally belongs to such county, by transferring such money from the state road tax fund into the general fund until the sum advanced to the county out of the general fund is fully repaid. This law was also approved May 15 of this year.

Another law known as the automobile tax law was passed which provides a tax of $5 on automobiles of 25 HP., and less $10 on automobiles between 25 and 40 HP., $15 on automobiles above 40 HP., $5 for chauffeurs, and $2 for motorcycles. It is estimated that this tax will raise $20,000 annually, which is to be expended under the direction of the state highway officials.

A new law was also passed providing for the abolition of the offices of county road superintendent and county surveyor, and creating the office of county engineer, the incumbents to be appointed by the county boards of supervisors. The law also authorizes the county boards of supervisors to levy taxes not to exceed 25 cents on each $100 valuation, for the purpose of improving county roads. This levy, it is expected, will raise a fund of about $1,000,000 in all the counties during the current year.

Approximately two hundred farmers, lawyers, doctors, business men and other citizens of Washington, Ark., recently spent a day working on a road leading out of the town toward Hope. About a mile of sand-clay road was completed. It was planned to set aside Wednesday of each week for similar purposes.

Third Annual Report of the British Road Board

The Third Annual Report of the British Road Board for the year ending March 31, 1913, has recently been submitted to the Treasury by Sir Geo. S. Gibb, Chairman, and W. Rees Jeffreys, Secretary. The report, which is noted briefly elsewhere in this issue, contains a large amount of statistical information on the operations of the Board and an explanation of the methods of administering its affairs.

The British Road Board was formed in 1910 for the purpose of aiding the county councils and other local authorities of Great Britain in the construction and maintenance of new roads and the improvement of existing roads. The Board consists of four members: Sir Geo. S. Gibb, Chairman; the Rt. Hon. Lord Pirrie, P.C., K.P., LL.D., D.Sc.; the Rt. Hon. Lord St. Davids, and the Rt. Hon. Sir J. H. A. MacDonald, K.C.B. W. Rees Jeffreys is the Secretary and Col. R. E. Crompton, C.B., R.E., M. Inst. C.E., M. Inst. E.E., is the Consulting Engineer The Advisory Engineering Committee consists of H. Percy Boulnois, M. Inst. C.E., F.R. San. I.; J. A. Brodie, M. Inst. C.E.; P. C. Cowan, B.Sc., M. Inst. C.E., F.R. San. I.; H. P. Maybury, M. Inst. C.E.; J. Walker Smith, M. Inst. C.E., and John Willmot, F.S.I. Sir Geo. S. Gibb and Col. R. E. Crompton are ex-officio members of this committee.

While the report covers the year ending March 31, 1913, in some cases figures are given up to June 30 of this year. Up to this latter date, the total of the grants and loans made amounted to £1,474,793. This was divided among the different kinds of work undertaken, as shown in the following table:

Improvement of road crusts	£1,210,012
Road widenings and improvement of curves, gradients and corners	120,466
Road diversions	29,395
Reconstruction and improvement of bridges	53,842
New roads and bridges	61,078
Total	£1,474,793

The grants and loans indicated up to June 30, 1913, amounted to £3,435,233, or £1,960,440 more than the grants and loans made. This difference is due to the fact that grants and loans may not be actually paid until some time after they are indicated or allotted, since the arrangements under which grants and loans are made may provide for the payment of half the sum indicated in any particular case at the beginning of the work and the remainder at its completion or in installments payable at the time the grantees are ready to commence work, when the work is half completed and when the work is finished. In this connection, the method followed by the Road Board in making grants is of interest. As set forth in the report, this is essentially as follows:

Any local highway authority may apply for a grant or loan at any time, and all these applications are considered by the Board so far as possible when they are received. In deciding upon the making of a grant or a loan, the Road Board investigates its advisability, taking into account the conditions in the district in question, as revealed by information obtained by conferring with the county councils from time to time in regard to the requirements in each county, and from other sources. According to the usual procedure, a county council when making up its estimate for the ensuing year submits to the Road Board a general statement including a list of the contemplated improvements for which assistance is desired. This statement is not usually treated as a formal application, but is followed by a conference of the Road Board and representatives of the county council. At this, and, if necessary, at subsequent conferences, the question is discussed and the decision arrived at by the Road Board after a consideration of the various requests from all of the counties applying for aid. After the Road Board has selected the improvements upon which it is willing to grant aid and has suggested the amounts to be devoted to the work, the local authorities bring in detailed plans and specifications of the work. The Road Board then submits each case to the Treasury for its approval, which is usually prompt. The grants are then indicated by the Road Board.

The annual income of the Road Improvement Fund (calculated without regard to the date of the actual receipt of the sums involved) has steadily increased since the establishment of the Board, and during the year 1912-13 amounted to £1,252,970 4s. 10d. The details of the income are shown in one of the accompanying tables.

YEARLY INCOME OF BRITISH ROAD BOARD.

Item.	Apr. 30,1909, to Mar. 31, 1910.			Apr. 1, 1910. to Mar. 31, 1911.			Apr. 1, 1911, to Mar. 31, 1912.			Apr. 1, 1912, to Mar. 31, 1913.			Total.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Motor spirit duties	290,702	15	9	410,376	5	7	591,781	18	7	702,381	10	3	1,995,242	10	2
Carriage license duties	......			460,265	17	6*	403,270	19	11	493,790	6	9	1,357,327	4	2
Interest on investments & loans.	......			4,851	16	0*	23,064	13	7	56,798	7	10	84,714	17	5
Total annual income	290,702	15	9	875,493	19	1	1,018,117	12	1	1,252,970	4	10	3,437,284	11	9

*From Jan. 1, 1910, to March 31, 1911.

In regard to the policy of the Board in making grants and loans, the following statement is included in the report:

In settling the total amount up to which advances may safely be made at any date the Board do not confine themselves to dealing with the balance in hand, representing cash received less commitments. They are prepared to anticipate their income to a certain extent, but in view of the limited experience available in regard to the rate at which commitments will mature, and the probability that as the procedure and operations of the Board become better known to highway authorities there will be a constantly increasing acceleration in the maturity of commitments and the expenditure of money on assisted works, they have not thought it advisable to anticipate more than a year's income. They are confirmed in this view by the consideration that in their opinion the amount of road improvement work which is being undertaken by highway authorities (apart from urban street widenings to which, for reasons given in their previous annual reports, the Board are not generally disposed to make contributions at the present time, except in special cases) is, generally speaking, as much as can practically be carried out by the staff and with the monies at the disposal of highway authorities aided by advances from the Road Improvement Fund.

At the present time the Board are making grants on the assumption that they can safely indicate a sum of about £1,700,000 in addition to the indications made up to June 30, 1913. The following statement has been compiled to show how this figure of £1,700,000 has been arrived at. It will be seen that in fixing the amount for which additional indications are now being made the Board are anticipating their income up to March 31, 1914, and if the necessity arose, they would be prepared to go beyond the figure named:

STATEMENT SHOWING THE AMOUNT CONSIDERED TO BE AVAILABLE AT JUNE 30, 1913, FOR GRANTS AND LOANS FROM THE ROAD IMPROVEMENT FUND.

Receipts of the fund from May, 1910, to March 31, 1913	£3,329,420	
Amount attributable to year 1912-1913 received after March 31, 1913	107,865	
		£3,437,285
Estimated income, year ending March 31, 1914		1,340,000
		£4,777,285
Less: Administrative expenses to March 31, 1914, say.		45,000
		£4,732,285
Set aside for works to be carried out in a period of trade depression and meanwhile used for short loans for road improvement. (Loans to the extent of £838,481 have been indicated, but the additional amount can be provided out of floating balances of grants)		700,000
		£4,032,285
Grants indicated up to June 30 1913	£2,596,752	
Less: Postponed payments included therein	233,962	
		2,362,790
Balance available at June 30, 1913, for grants on assumption that income to March 31, 1914, may be anticipated		£1,669.495
say		£1,700,000

The Improvement of the Old National Road in Maryland

When Ohio was provisionally admitted to the Union in 1802, it was provided that one-twentieth part of the net proceeds from the sales by Congress of lands lying within the state, after a certain fixed date, should be devoted to laying out and building public roads "from the navigable waters emptying into the Atlantic, to the Ohio, to the said state through the same, such roads to be laid out under the authority of Congress, with the consent of the several states through which they shall pass." This was the first definite step in the building of the National Road, also designated as the Cumberland Road, because its eastern terminus was at Cumberland, Md.

The story of the old road has been written many times. The first section extended from Cumberland, Md., to Wheeling, W. Va., and was built by the federal government. It was opened to travel, and by 1818 used by mail coaches running between Washington, D. C., and Wheeling, on a regular schedule. It was later proposed to extend the road to the Mississippi River at a point near St. Louis, Mo., and parts of the extension were built.

The advent of railroads diverted much of the through traffic from the road and it began to fall into disrepair. For years it received little attention, but when public interest in road improvement began to be aroused efforts were made in various places along the old National Road to bring about its rehabilitation. One of these places was the western part of Maryland, where the road, beginning at Cumberland, extends for a distance of over 25 miles through Allegany and Garrett counties to the Pennsylvania line. Largely through the efforts of W. E. G. Hitchins and his fellow-members of the Allegany County Road Directors, extensive improvements have already been made and further work is planned.

WEST UNION ST., FROSTBURG, MD.—A PORTION OF THE NATIONAL ROAD WITHIN THE CITY LIMITS.

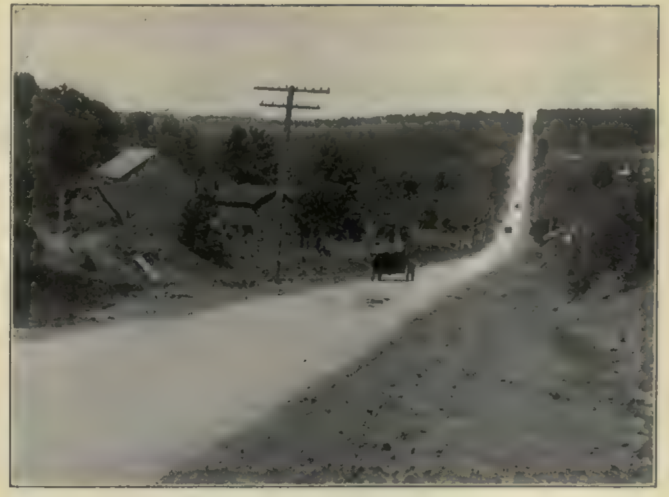
Five years ago the road between Frostburg, Allegany County, and Grantsville, Garrett County, was in very bad condition—"a little less rough than a creek bottom and hardly better for travel," to quote a Frostburg man familiar with conditions. The eastern portion of Garrett County, where all but a short stretch of this section of the road is situated, is a farming country in which little money is available for road work, and conditions were about as unfavorable as they well could be to the making of extensive improvements. Realizing the necessity for doing something Mr. Hitchins and G. C. Townsend devoted themselves to the task of arousing public sentiment. Through a series of meetings of Garrett County farmers and citizens of Frostburg the state was induced to resurface about nine miles of the road, and efforts are now being made to arouse public sentiment to bring about the completion of the work by the state.

The accompany illustrations show unimproved and improved sections of the road between Frostburg and Grantsville, and an old stone bridge near the latter place.

The large illustration at the foot of page 114 is a view on the improved section of the road extending six miles west from Frostburg. The photograph was taken at Johnson's farm about four miles west of that city.

VIEW ON THE OLD NATIONAL ROAD ABOUT FOUR MILES WEST OF THE CITY OF FROSTBURG, MD.—PART OF AN IMPROVED SECTION SIX MILES LONG.

VIEW ON AN UNIMPROVED SECTION OF THE NATIONAL ROAD ABOUT 6½ MILES FROM FROSTBURG, MD.



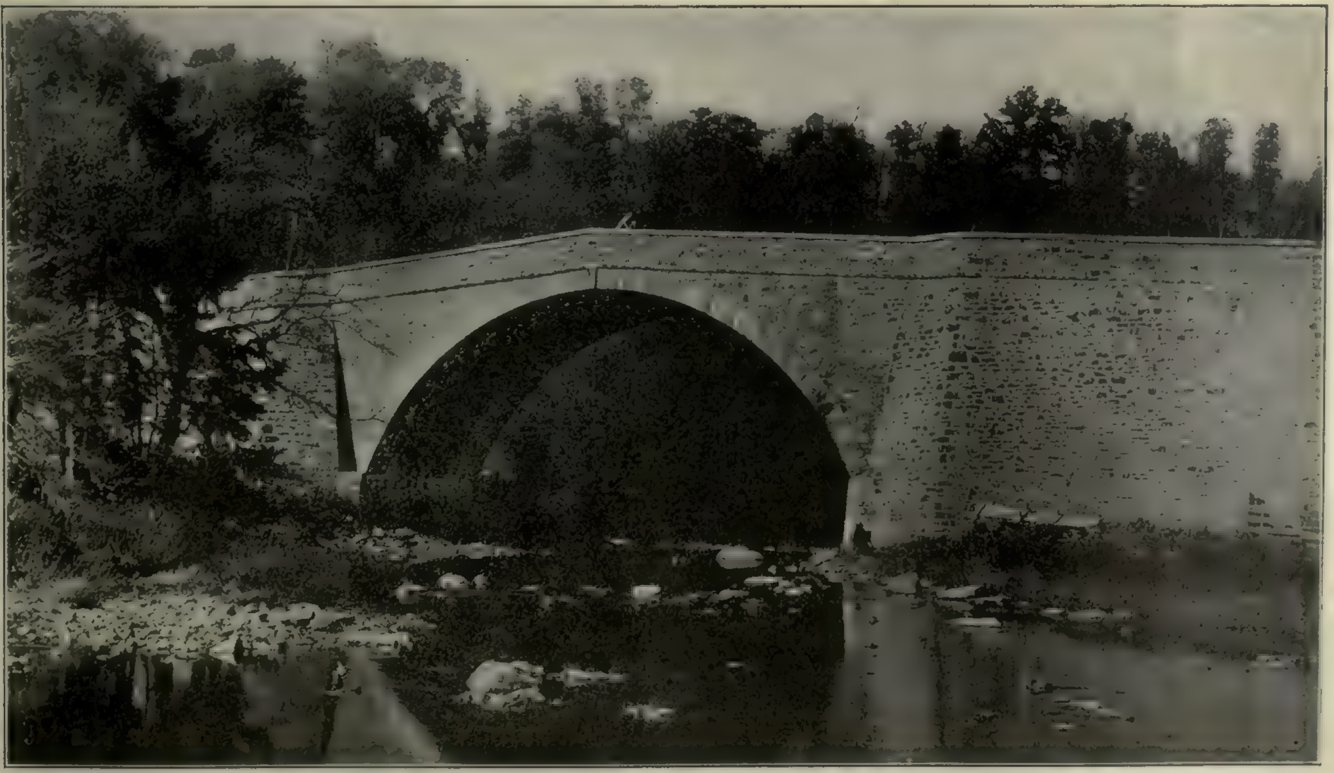
IMPROVED PORTION OF THE NATIONAL ROAD ON THE SO-CALLED "LONG STRETCH."

The small illustration at the top of the same page shows a section of the National Pike inside the city limits of Frostburg, where it is known as West Union street. This section adjoins the improved road at the westerly city limits. At this point, according to Mr. Townsend, the city authorities erected a conspicuous sign to the effect that the speed limit was 10 miles an hour.

The illustration on the left at the top of page 115 is a view on the unimproved portion of the old National Pike about 6½ miles west of Frostburg. This is the beginning of a stretch of about 7½ miles which is in very bad condition, but of which 2½ miles, extending easterly from Grantsville, was put under contract this season. The completion of this contract will leave 5 miles of unimproved road, which is the portion on which improvement work is being urged. This is a part of the section of road known locally as the "Long Stretch."

On the right, at the top of the same page, is shown another view of the "Long Stretch" on a portion which has been improved. This view illustrates the manner in which the road was originally laid out, excessive grades often being made for the sake of keeping the road straight. The engineers who located it were instructed to take the most direct route to the west, but not to exceed a maximum grade of 5 degrees, with the result that in many cases steep grades were put in where a much better grade could have been secured by a deviation from a straight line, increasing the distance by only a very little.

The large illustration at the bottom of page 115 shows the old stone arch known as the Grantsville Bridge. This bridge crosses Castleman River, just east of Grantsville, at what is known as Little Crossing, which is just below the point where Braddock's army crossed the river on its march to attack the French at Fort Duquesne. The bridge, which was one of the old structures, has recently been repaired by the state.



THE GRANTSVILLE BRIDGE ON THE OLD NATIONAL ROAD—OLD STONE ARCH REBUILT BY THE MARYLAND STATE HIGHWAY DEPARTMENT.

Methods of Lighting Public Highways and Vehicles*

By COL. H. C. L. HOLDEN, C.B., F.R.S.†

Nine papers in all have been contributed by the representatives of the countries, enumerated as follows: (A) Austria, one; (B) Belgium, one; (C) France, two; (D) Germany, one; (E) Great Britain, two; (F) Russia, one; (G) United States, one.

(A) The paper contributed by Leo Stransky of Vienna deals with both the lighting of highways and vehicles. He advocates a central system of lights for broad thoroughfares in urban districts, the lamps being suspended on central masts when this is practicable, or on wires run across the road when it is not. As regards high roads in the country, he insists upon the necessity of an international method of marking obstructions, whether of a temporary or permanent character, with lights during the night and signals during the day. As regards vehicles, he points out that regulations as to carrying lights are not always strictly enforced as they should be and suggests blue as a color for a rear light, or for the back glass of a side light, in cases where a tail light is not used, on the side nearest the traffic.

(B) J. Hansez of Brussels deals first with the general question of lighting public thoroughfares and considers that on the whole electric incandescent lamps arranged in groups are the most satisfactory in towns and their immediate vicinity; and outside these areas and on the highway, only swing bridges, obstacles, railway crossings, etc., need be lighted, but their lighting should be made compulsory.

He discusses the lighting of vehicles, especially motor cars carrying powerful headlights the excess of light from which, if though sometimes inconvenient, is a fault on the right side, and concludes by calling attention to the great necessity for regulations in connection with the drivers of cattle who, carrying no lights, are a constant source of danger to other users of the road.

(C) Two papers are contributed from France, one by P. Tur, who gives a brief history of the subject with details of the present conditions of highway lighting on main roads through towns and on the public streets of Paris at the present time, and further deals with the lighting of barriers and other obstacles as well as level crossings. He then proceeds to enumerate various improvements which might be applied to existing systems, and calls attention to what has been done in France since 1907 in improving the lighting of level crossings, but adds that the major portion of the level crossings in France have not yet been satisfactorily lighted.

E. Chaix—who contributes the other French paper—considers the question of the lighting of vehicles, which he is strongly of the opinion should, without any exception whatever, carry a light or lights on roads where public safety calls for it. He then discusses in detail the best form of light for horse-drawn vehicles, its position on the vehicle and the difficulties that may and do occur in special instances, and how they may be surmounted. He considers it of the highest importance that such light should be visible from front and rear. Convoys should be specially legislated for and also vehicles which are heavily laden with cumbrous and projecting loads. Stationary vehicles should, in his opinion, also have lights showing to the front and rear. The lighting of motor cars and motorcycles is treated separately. If motor cars travel at over 20 miles an hour at night they should carry powerful lights, which attract the attention better although they may be dazzling. The use of colored lights should, in the author's opinion, be prohibited. Motorcycles, which are in many ways more dangerous than motor cars, should come under the same regulations as to lights as motor cars; ordinary bicycles need only carry lights as a warning. Referring to the reflex light system he characterizes it as ingenious, but one that does not fulfil all requirements. The paper concludes with a series of resolutions which it is proposed that the Congress should adopt, relating to the lighting of (1) horse-drawn vehicles; (2) stationary vehicles; (3) convoys or long loads; (4) motor cars; (5) motorcycles; (6) bicycles (including tricycles?).

(D) G. Fleck of Dresden describes in some detail the lighting of the streets of German towns which he divides into three groups according to the number of their inhabitants, also the systems used, spacing of lamps, their power, duration of burning, etc., and cost. He refers to the laws and regulations governing the lighting of vehicles, but considers them insufficient at the present time because cabs, vans and the like are not compelled to carry rear lights, as he considers they should in order to prevent accidents from faster traffic overtaking and colliding with them.

(E) Two papers are contributed by Great Britain. The first of these, by John S. Brodie—after directing attention to the legal position, which he says is that the local authorities have powers to light streets, but are not compelled by law to light them—discusses in considerable detail means of lighting, the necessity for increased illumination, the standards of illumination required for streets and highways and the necessity for uniform illumination and color with an absence of glare, and points out the difficulties in obtaining perfection in these respects. He further describes the improvements in gas lighting and its control which have taken place in recent years, as well as the improvements in electric lighting, especially in arc lamps and incandescent lamps, which have enabled electricity to compete successfully with the latest gas burners, and concludes by giving relative costs of the various systems and other details in two appendices.

The other paper, by G. W. Watson, deals entirely with the lighting of vehicles by means of oil lamps, etc., and the more modern systems of acetylene and electricity. The best known forms of apparatus are more or less fully described.

(F) H. Merczyng contributes a paper from Russia, which deals mainly with the lighting of country roads which form the main arteries of traffic near towns or in places so densely populated that much traffic has to be carried on at night. The problem as he puts it is to light a long, narrow strip of road effectively and economically, and he thinks the solution is to be found in the use of flame arc lamps on account of their low consumption of energy and the color of their light, which penetrates fog to a remarkable degree when the salts used are such as to produce a yellow flame.

(G) From the United States of America comes a very complete article (by Dr. Clayton H. Sharp) describing first of all the conditions existing in America in the past and at present, and laying stress on the vast tract of country, and the roads which are more remarkable for their quantity than quality. After giving some particulars about gas lighting he passes on to electric distributing systems and deals with these and subsequently wiring systems and lamps very comprehensively, and in addition discusses the question of design of standards and deterioration and maintenance of the systems.

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*From the general report on Question 5—"Methods of Lighting Public Highways and Vehicles"—Third International Road Congress, London, England, June 23 to 28. A part of the report consisting of a note by the general reporter has been omitted here as it refers entirely to technical details of various automobile lighting systems and has no particular application to road work.

†General Reporter on Question 5.

He then turns his attention to the principles of illumination and the effects of street surface, glare, etc., following this up with data as to the actual illumination required under different conditions. The remainder of the paper is taken up with the consideration of the arrangement of lamps to produce the desired effect, computations of illuminations, effects of reflection and measurement of actual illumination.

Resolutions*

1. For the purposes of a general determination of methods of lighting, highways may conveniently be divided into three classes, as follows :

(1) Important streets in cities, towns or other urban areas in which the traffic after dark is considerable in volume.

(2) Important suburban roads in the vicinity of large towns.

(3) Rural roads;[1]

and having regard to modern conditions of traffic it is essential that adequate lighting by means of fixed lights should be provided in classes 1 and 2.

2. As a general principle in the lighting of all highways which require to be lighted by means of fixed lights, the method of lighting to be adopted should be such as will provide an illumination as uniform and free from glare as possible. The amount of illumination and the position of lamps must be determined with reference to local circumstances.

3. It would be impracticable to light rural roads[2] generally, by similar methods to those adopted in urban streets or suburban roads, and the lighting of vehicles using[3] rural roads at night is therefore of the highest importance.

4. (1) All vehicles, whether standing or moving, on the road should be compelled by law to carry suitable lights in front and in rear or lighted lanterns, so constructed and fixed that the beams shall as far as practicable be visible both from the front and the rear.[4]

(2) Every motor car must carry, after nightfall, two lighted lamps in front, and one at the back; if it is able to move at a high speed it must also[5] be fitted in front with a headlight of sufficient illuminating power to light up the road or path for at least 50 yards to the front. In inhabited places where the ordinary lighting is sufficient to allow motorists to see their way and to be easily seen the light of the headlight must be limited to that of the ordinary lamp.

5. (1) It is desirable that all obstacles across a road, such as gates, and particularly gates at railway level crossings, should be painted white and should be clearly lighted at night by means of fixed lights, preferably of a red color, to indicate danger.[6]

(2) It is desirable to paint white or indicate by some other method all danger signal posts, direction posts and other posts, milestones, wheel curbs, bridge abutments, etc., or other special features, the indication of which would aid travelers, or conduce to safety.[7]

6. Red[8] should be universally adopted as the color for danger signals.[9]

Report on the London-Folkestone Experimental Road†

By MAJOR W. W. CROSBY

Weather conditions dry, clear and sun very hot. Slight breeze.

Section 1. "Ordinary granite" laid by the Kent County Council, June, 1911. Repaired in February, 1912, and relaid in September, 1912. Present condition: Good; dusty behind buses.

Section 2. "Tar painted granite," laid by the Kent County Council, June, 1911. Surface dressed with tar in April, 1912; relaid in September, 1912. Present condition: Good, slightly uneven; dusty behind buses. Both Sections 1 and 2 show considerable wear on up grades.

Section 3. "Single pitch grouting," laid by the Kent County Council, July, 1911. Repaired in January, 1912 and surface dressed with pitch matrix in April, 1912. Present condition: Very good, though slightly wavy and uneven; slightly dusty behind buses.

Section 4. "Double pitch grouting," laid by the Kent County Council, July, 1911. Repaired January, 1912 and surface dressed with pitch matrix in April, 1912. Present condition: Good, though slightly wavy and uneven.

Section 5. "Durax," laid by the Durax Dustless Roads, Ltd., July, 1911. No repairs to October, 1912, and no evidence of any since. Present condition: Good; slight excess of pitch evident but no bleeding.

Section 6. "Plascom macadam," laid by Plascom Ltd., July, 1911. Surface dressed with Plascom in May, 1912. Present condition: Fair; some bleeding, and surface wavy and uneven.

Section 7. "Cormastik," laid by the British Cork Asphalt, Ltd., August, 1911. Repaired in December, 1911, and in March, June, August and September, 1912. Present condition: Firm, even, smooth and slippery.

Section 8. "Kentish ragstone tar macadam," laid by Chittenden & Simmons, Ltd., July, 1911. Repaired in January, February, July and September, 1912. Present condition: Uneven, bleeding; road metal showing through and surface apparently not slippery.

Section 9. "Slag tar macadam, one coat," laid by Constable Hart & Co., Ltd., July, 1911. Repaired twice in February, 1912, and once in June and once in August, 1912, then surface dressed with tar. Present condition: Excellent plus; mosaic surface, not slippery.

Section 10. "Slag tar macadam, two coats," laid by Constable Hart & Co., Ltd., July, 1911. Repaired in 1912; surface dressed with tar in August, 1912. Present condition: Excellent; smooth.

Section 11. "Tarmac," laid by Tarmac, Ltd., July, 1911. Repaired in April, 1912, and then surface dressed with tar later in the same month. Present condition: Excellent; smooth.

Section 12. "Roadoleum," laid by the Anglo-American Oil Co., August, 1911. Repaired in March and in August, 1912. Single pitch grouting laid in September, 1912. Present condition: Bleeding, uneven and surface pitted.

Section 13. "Rocmac," laid by Rocmac, Ltd., August, 1911. Repaired in May and in August, 1912. Present condition:

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*The conclusions adopted at the final session of the congress were printed in "Good Roads" for August 2, 1913—those on the Fifth Question on page 52. The numbers in the resolutions printed above, which are those proposed by Col. Holden, refer to footnotes in which the changes, elisions and additions made by the congress at the final meeting are indicated.—Ed.

(1) In the final conclusions: "Rural roads in open country."

(2) In the final conclusions, "rural roads in open country."

(3) In the final conclusions, "using" is replaced by "running or standing on."

(4) In the final conclusions this reads as follows: "Every vehicle whether standing or moving should carry or show a light of sufficient power at night which can, except when specially authorized, be seen from the rear as well as from the front of the vehicle."

(5) The word "also" omitted in the final conclusions.

(6) In the final conclusions, "should be painted white and in other colors in alternate parts and illuminated by fixed lights which are lighted at dusk."

(7) In the final conclusions, "or conduce to the safety and convenience of the traffic."

(8) In the final conclusions: "One and the same color."

(9) The following paragraphs added to the final conclusions:

"The meeting, on the proposal of Mr. Chaix, unanimously adopted the following resolution:

" 'It is desirable that each Government should do away as soon as possible with colored lights on automobiles.'

"On the proposal of Mr. Hansez, the meeting adopted the following resolution, with two dissentients:

" 'The Congress expresses the wish that regulations should be made to compel drivers of herds of cattle to make their presence known at night.' "

†Observations on the condition of the experimental sections on the London-Folkestone Road, between New Eltham and Sidcup, Kent, England, made by Maj. Crosby on June 29, 1913.

Surface generally firm and fairly good; near beginning are some waves and uneven places; section shows pitting in places.

Section 14. "Bituminous macadam," laid by the Taroads Syndicate, Ltd., August, 1911. Repaired in March, 1912; surface dressed with mixture in May, 1912. Present condition: Wavy and bleeding badly.

Section 15. "Granite grouted with Tarvia," laid by Bristowe & Co., Ltd., August, 1911. Repaired in March, 1912; surface dressed with Tarvia in June, 1912. Present condition: Wavy, uneven and bleeding.

Section 16. "Tarviated macadam," laid by Bristowe & Co., Ltd., July, 1911. Repaired in February and in March, 1912; surface dressed with Tarvia in June, 1912. Present condition: Uneven, wavy and bleeding.

Section 17. "Roadamant," laid by the Roadamant Co., Ltd., July, 1911. Repaired in January, June and July, 1912; old surface taken up and relaid in September, 1912. Present condition: Firm, smooth and fairly good; shows long waves possibly due to traffic conditions.

Section 18. "Lithomac," laid by the Limmer Asphalte Paving Co., Ltd., July, 1911. Repaired in February, 1912; surface laid with bitumen in February, 1912, and repaired in July, 1912. Present condition: Firm, rather wavy, very smooth; cracks in evidence in one or two places; no excess of pitch apparent on surface.

Section 19. "Pitchmac," Brodie's system, laid by the Taroads Syndicate, Ltd., July, 1911. Surface dressed with mixture in May, 1912. Present condition: Good; surface even, some bleeding, especially at sides.

Section 20. "Natural asphalte matrix," laid by the Val de Travers Asphalte Paving Co., Ltd., July, 1911. Repaired in September, 1912. Present condition: Soft and bleeding; some waves; wheel marks apparent.

Section 21. "Asphalte matrix," laid by the Val de Travers Asphalte Paving Co., Ltd., June, 1911. Repaired in December, 1911, and in January and February, 1912; relaid in February, 1912, and repaired in September, 1912. Present condition: Soft, bleeding and rutted to a depth of ½ in.

Section 22. "Trinidad asphalte macadam, 3-in.," laid by the Trinidad Lake Asphalt Paving Co., Ltd., June, 1911. No repairs necessary to October, 1912, and none apparent since. Present condition: Poor; some waving apparent, especially at sides.

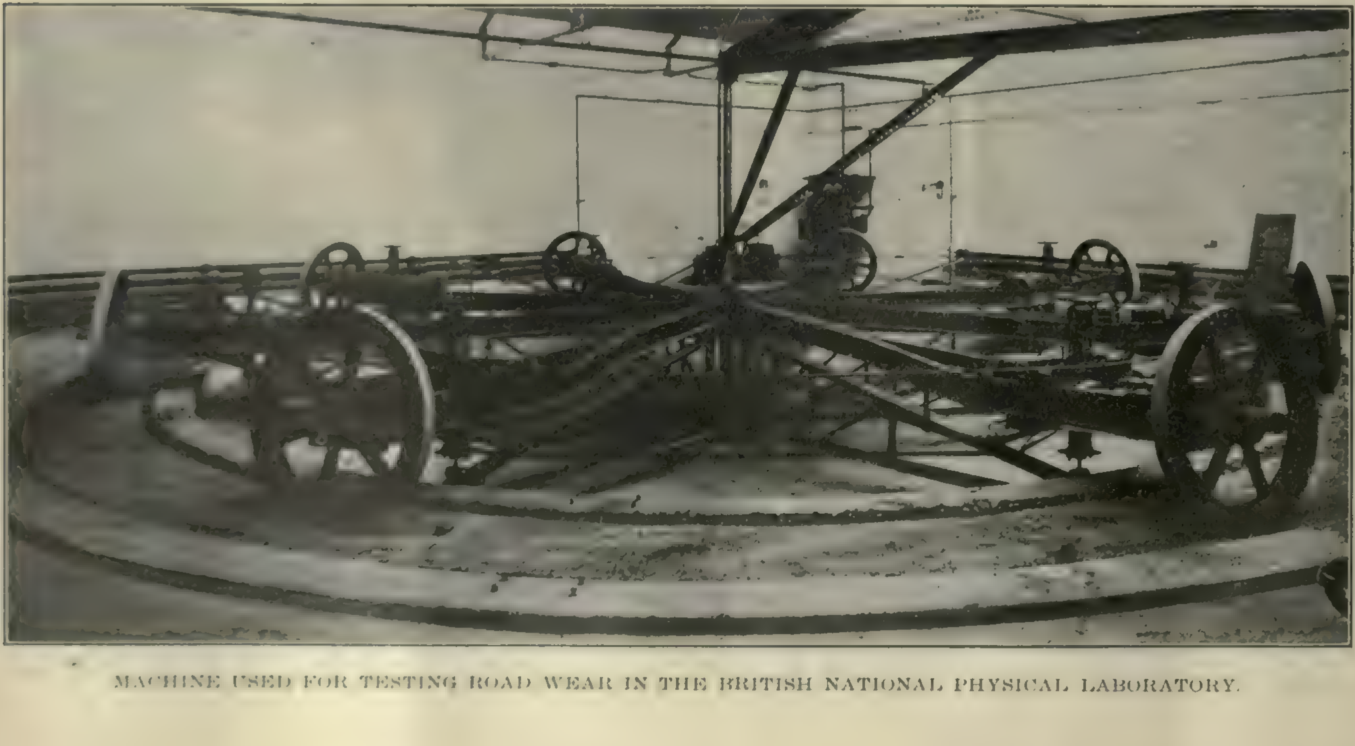
Section 23. "Trinidad asphalte macadam, 4-in.," laid by the Trinidad Lake Asphalt Paving Co., Ltd., June, 1911. No repairs up to October, 1912, and no evidence of any since. Present condition: Fair to good. At beginning of this section, some waves are apparent especially at sides. In one or two places, the surface was so soft that wheels had cut into it for a depth of several inches, exposing an apparent excess of bituminous material in these spots.

Road Testing Machine in the British National Physical Laboratory

In order to supplement the experiments being carried on with test roadways, there has been installed in the National Physical Laboratory at Teddington, England, a machine for testing the wear on road surfaces of various kinds.

The apparatus, which is shown in the accompanying illustration, is designed to reproduce as nearly as possible the conditions obtaining in actual service. It consists, essentially, of a circular roadway, approximately 104 ft. long, and a horizontal framework consisting of spokes radiating out from a pivoted center and fitted at the ends with wheels which travel over the roadway as the frame is revolved about its axis. In the roadway is laid the surfacing or pavement which it is desired to test. The wheels, eight in number, are about 3 ft. in diameter and are so arranged that the load on each can be varied as desired. Each of these wheels represents the driving wheel of a motor vehicle and the machine is equipped with appliances for imitating the conditions produced by climate or weather. Sprinkling devices are employed when desired and the speed is adjustable.

The machine has recently been completed, and only a few actual tests of road material have yet been made. It is stated, however, that several facts of considerable interest have already been observed. One of these observations, according to Col. R. E. Crompton, M. Inst. C. E., Consulting Engineer of the Road Board, is that "certainly on the machine and most probably on the actual roads, the real causes which necessitate road repairs are not due to surface wear itself, but to the movement and displacement of the stones immediately below the surface, so that the surface of the road under test, instead of remaining in its original flat condition, gradually resumes a wavy form and these waves become accentuated by the rolling of the wheels until the road becomes so rough that the experiment on the machine has to be discontinued, or if it occurred on an ordinary road, would necessitate repairing the surface."



MACHINE USED FOR TESTING ROAD WEAR IN THE BRITISH NATIONAL PHYSICAL LABORATORY.

New Highway Law in South Dakota

At the last session of the South Dakota Legislature a law was enacted which established a state highway commission and considerably modified the administration of road work in the state. Formerly highway affairs were carried on under either the county or township system. In the first case the work was done under the supervision of county commissioners, and in the second under that of township boards of supervisors.

A board of county commissioners consisted of five members and a board of township supervisors of three members. Both commissioners and supervisors were elected by popular vote.

The text of the new law (Chapter 233, H. B. 387), entitled "An Act providing for a State Highway Commission, for the Appointment of the Members thereof and Defining its Powers and Duties, is as follows:

"Section 1. Within a reasonable time after the passage and approval of this act the Governor shall appoint a board of three commissioners, one from each congressional district in this state, to be known as the State Highway Commission; one shall serve two, one three, and the other four years, or until a successor has qualified, but not more than two members shall belong to the same political party. The governor shall fill all vacancies and may remove a member for inefficiency, malfeasance or neglect of duty. All questions shall be determined by a majority vote of such commission.

"Section 2. Said State Highway Commission shall elect from its members a chairman, the members thereof shall have power to administer oaths, and it shall be provided with a suitable office at the capitol of the state where it shall hold its meetings.

"The State Highway Commission shall keep a record of every vote and of its official acts, shall file and safely keep all maps and papers belonging to it and shall devote its work to the interests of the state. It shall also be the duty of the said State Highway Commission to give such advice, assistance and supervision with regard to road and bridge construction throughout the state as may be required and as the rules and regulations of the commission may prescribe, and said State Highway Commission, or any of its members may attend any public meeting held in the interest of road improvements in this state; provided, that nothing in this act shall prevent any county, or municipality, or organization from paying the charges of such Highway Commissioners when in attendance upon such meetings; provided, further, that nothing in this act shall be construed as requiring such county or municipality, or organization to pay such charges.

"All of the files and records of said commission shall, under reasonable regulations, be kept open for public inspection, and certified copies thereof shall be received in evidence in any court of the state.

"The Attorney General of the state shall be ex-officio attorney for the commission and shall give the commission such legal advice, counsel and service as it may from time to time require.

"Section 3. Whenever practicable said commission shall investigate and determine the location of road material in the state, ascertain the most approved methods of construction and improvement of roads, investigate the most approved laws in relation to roads in other states and hold public meetings throughout the state when deemed advisable. On or before December 15th, of each year, it shall make a printed report to the governor, stating, among other things deemed by it expedient and of general interest on the subject of road building, as near as possible, the number of miles of roads built or improved during the preceding year and their cost; the general character and needs of the roads of the state; and recommend such legislation as it deems advisable.

"Section 4. As soon as the Highway Commission shall have ascertained the location of the available road material throughout the state, and the best methods of road and bridge construction, as far as the same may be practicable, it shall prepare and adopt such rules and regulations for the construction and improvement of roads as shall be most suitable to the requirements thereof, and bring the most practical results to the several parts of the state.

"No member of the Highway Commission shall be, either directly or indirectly, interested financially in any contract for constructing or improving any road under this act.

"Section 5. Any county board may designate any established road, or specified portion thereof, in its county as a state road subject to the approval of the State Highway Commission, and construct or improve the same in accordance with the regulations of the said Highway Commission relative to roads; provided, that nothing in this act shall be construed as limiting the power of the State Highway Commission in designing and establishing state roads.

"Such work may be done under contract or by day labor, as the county board may direct, and a report thereof shall be made by said superintendent in duplicate as may be required by the Highway Commission, one copy of which shall be delivered to the County Auditor and one to the State Highway Commission.

"Section 6. Whenever any county board makes application to the State Highway Commission for the designation of an established road running from the county making such application into an adjoining county, as a state road, such commission shall investigate the need for such road and if it shall decide that it is necessary, shall so designate such road and determine and fix the part of the cost of the improvement thereof to be paid by each county.

"Section 7. It shall be the duty of the counties to make all necessary surveys, estimates and specifications for work to be done on state roads, which said surveys, estimates and specifications shall be subject to the approval of the State Highway Commission. It shall also be the duty of said Highway Commission, upon the request of any board of county commissioners, within their respective counties, to advise and consult with such county board in the construction or improvement of county roads, and lend every possible assistance to the local road authorities in bettering the public highways. All work done on state roads may be subject to the inspection and approval of the State Highway Commission.

"Section 8. After any county board shall have completed any work on a state road, the auditor of such county shall make a statement to the State Highway Commission, showing the location, nature and cost of such work, and shall also submit a detailed report of all details concerning the same as may be required by the State Highway Commission. On receipt thereof the said State Highway Commission shall proceed to examine such report and if found satisfactory shall accept the same and shall cause such report to be placed among its files and records.

"Section 9. The word 'road' or 'highway' whenever used in this act shall be construed to include all bridges upon or which form a part of the road or highway to be improved or constructed.

"Section 10. All acts or parts of acts in conflict with the provisions of this act are hereby repealed."

Emil A. Nuebling, Superintendent and Engineer of the Water Department of Reading, Pa., is preparing plans for the construction of a boulevard two miles long on land owned by the city and controlled by the water department, along the Maidencreek.

Homer M. Derr, The New State Engineer of South Dakota

Homer M. Derr, who became State Engineer of South Dakota when the new state highway law became effective, was born in 1872 at Turbotville, Pa. He graduated from the State Normal School at West Chester, Pa., and later entered the University of Michigan, and took up a course in mechanical engineering, following it as far as the junior year. He afterwards spent one summer term in the Michigan College of Mines, and a year at the University of Minnesota, after which he studied for a time at Leland Stanford University in California, graduating from that institution with the degree of A. B.

Mr. Derr then spent some time with the Green Mountain Mining Co. in Kern County, Cal., in charge of exploration work. Later he accepted a scholarship in the School of Applied Science, at Columbia University, and received the degree of A. M. from that institution in 1901. He served two years as instructor at Columbia, and at the end of that period went to the University of Wyoming, to assume charge of the Department of Mining Engineering. Later he was appointed Tyndall Fellow at the University of Pennsylvania, receiving the degree of Ph. D. from that university in 1903. He spent the year following in Colombia, South America, building a dam and installing appliances for hydraulic gold washing for the Santa Margarita Gold Mining Co. of New York. Returning to the United States, he accepted a professorship in mathematics and civil engineering at the Clarkson School of Technology, which position he held until 1906, when he went to the South Dakota State College as professor of civil engineering. He held this position until his recent appointment by Governor Byrne of South Dakota as State Engineer.

HOMER M. DERR, STATE ENGINEER OF SOUTH DAKOTA.

Mr. Derr has maintained a practice as consulting engineer in various lines of railroad work, city engineering, hydraulics, irrigation and mining operations, and was for two years connected in an engineering capacity with the South Dakota Railroad Commission, making the physical valuation of the railroads of the state.

He is an associate member of the American Society of Civil Engineers.

Volunteer Street Work in Pueblo, Colorado

The city of Pueblo, Colo., is situated near the center of Pueblo County, in which many first-class roads have been built by convict labor under the supervision of the Board of County Commissioners. This condition naturally gives rise to a demand from the residents of the city for well kept city streets, but legal difficulties have made it impossible to secure these by the ordinary means during the past two years.

SQUAD COMPOSED OF BUSINESS AND PROFESSIONAL MEN AT WORK ON A STREET IN PUEBLO, COLORADO.

The complications in the city of Pueblo are due to the situation which was created when the city adopted the commission form of government about two years ago. This action was followed by attacks upon the form of government through the courts, with the result that the city has been unable to vote the bonds for raising the funds for necessary public improvements. The business men of the city generally favor the commission government and large paving districts have been formed, although the circulation of petitions for signatures has been delayed until the legal questions involved are settled. In the meantime, citizens of the city have organized squads and, under the supervision of the Commissioner of Highways, have worked in the streets, repairing them and putting them into passable condition.

The accompanying illustration shows one of these squads at work on a street in Pueblo. The group consists of some of the most prominent business and professional men of the city, including two physicians, three wholesale merchants, one manufacturer, one railroad official and one minister.

Missouri "Good Roads Days"

It is reported that approximately two hundred and fifty thousand men spent August 20 and 21 working on the roads of Missouri in response to Governor Major's proclamation designating those days as "good roads days." Definite figures as to the number of men employed, the mileage of road worked and the approximate value of the work done are to be compiled and made the subject of a report by State Highway Commissioner F. W. Buffum.

Governor Major, together with Governor Hodges of Kansas, Congressman Dorsey W. Shackleford of Missouri, State Highway Commissioner Buffum and other prominent men, took an active part in the work. Moving picture films showing the work in progress were made by one of the leading film companies and will be shown at the Detroit road meeting this month. The pictures will also be shown in one of the semi-weekly pictorial news reviews which are put out by the company.

Opportunities for Highway Engineers in Municipal Work[*]

By GEO. W. TILLSON, M. Am. Soc. C. E.[†]

A few years ago the author was criticised for the statement that the municipal engineer was behind his associates because he had not been able to produce a pavement that was entirely satisfactory. He still believes, however, that the original statement was true. This being the case, it follows that the perfect pavement has not yet arrived, and also that there are great opportunities for the highway engineer in municipal work.

The question than seems to be: How can he best make use of these opportunities?

In order to produce the best results he must thoroughly understand the properties of the different materials used in street construction, how they can be combined satisfactorily, and how to use these combinations after they have been made.

While the above comprises but a few words, the carrying out of the ideas involves a large amount of intelligent and patient study.

Pavement construction is a science. The situation is very different from what it was a few years ago even. The advent of the automobile for business as well as pleasure is responsible for this. An automobile weighing from two to three tons and moving with a speed of 30 or 40 miles an hour requires a very different type of pavement from a carriage driven at the rate of 10 miles an hour. The same is also true of heavily loaded trucks.

There is probably no one material used more in the construction of roads and pavement at the present time than bitumen in some of its different forms. The engineer, then, through a competent chemist (as he will probably not have time to do it himself, even if he has the ability), should make himself conversant with all the different bitumens that are put upon the market. He should know all the different properties of each, their bad as well as good. He should have experiments made to determine the resultant of certain mixtures so as to counteract, if possible, the defects of one by the good qualities of another. He must ascertain also if his compound is stable, and will not be too seriously or too quickly damaged by oxidation or other natural causes. He should know the defects of the present pavements, and study to perfect his materials so that these defects will be corrected in the finished product.

Take granite, for instance. It is well known that this makes a very durable pavement. It is noisy, however, and often wears unevenly, so that on many streets it is very objectionable. A study should be made of the manufacture of the blocks with a view to having them made of such a size and shape and character that the objections will be reduced to a minimum. The method of laying is also important as both of the above objections can be materially reduced by special methods of laying, as, for instance, the size of the joints and the proper material for filling them, as well as the quality and depth of the material in which the blocks are imbedded. These are both important factors in overcoming the defects mentioned.

But there is probably more necessity for investigation in the case of wood pavements than in that of any other kind. It involves the question of the character of the wood, the method of, and material for, treatment, as well as the method of laying. The most mooted point is the character of the preservative. This refers both to its origin and specific gravity. The principal objection to wood pavements at the present time is their slipperiness, and it is probable that this defect might be materially reduced by careful study and reflection.

But the engineer should not be satisfied with the pavements now in use. His knowledge should be such as to suggest possible combinations of Nature's wonderful variety of materials, so that a new and more satisfactory pavement might be evolved, and so that all materials, whether in an original or combined state, could be used to their best advantage.

But even when the engineer has learned all about the different materials and the results of their combinations his troubles are not over, for he then comes to the final test of application, that is, to pave the streets with the materials best adapted to them. The problem is not a simple one. The engineer will find that the different interests desire different materials. For instance, the people residing or doing business on a street wish a smooth, quiet pavement and one that is easily cleaned, and care nothing for how it affects traffic; the team owners, on the other hand, wish a pavement that offers slight resistance to traffic and is not slippery, and have no regard whatever for the noise caused by the vehicles. Then, too, the determination of the officials themselves may often differ from that of either of the above interested parties. To harmonize these different demands, even after a careful study has been made of the materials, is not a simple matter.

The first duty of the official is to determine what material should be used upon a street from an economic and utilitarian standpoint. As a rule, pavement determinations in this country have been made by rule of thumb rather than from a study of scientific conditions. An asphalt pavement has been taken to be an asphalt pavement, and a stone block pavement a stone block pavement, and laid upon different streets without any definite idea of traffic. When an architect is about to design a building it is absolutely necessary for him to know what properties the building is required to have and to what extent it is to be used. The municipal engineer almost never has any data of this kind as regards street pavements. Engineers in different cities talk of heavy, medium and light traffic, but they have no idea what these terms mean, as they are simply comparative and not absolute. It is undoubtedly possible to go into any city of this country of over two hundred and fifty thousand inhibitants and hear it said that a certain intersection has more traffic than any other intersection in the country except New York. New York is generally excepted, especially if the visitor happens to be a New York man. The Borough Engineer of Fulham, London, has worked out a formula, deduced from the time certain wood pavements have lasted under traffic, by which he estimates the life of any wood pavement under any given traffic. This would probably be quite accurate if the word "traffic" were more definite. In this country little attempt has ever been made to take any traffic census. The Boroughs of Manhattan and Brooklyn, New York City, have, however, done something along this line during the past few years, and it is hoped the practice will be continued and also extended to other cities.

The writer has, however, seen no well-established and defined unit of traffic. The values of the different fuels are rated in British thermal units, and it seems as if a scheme similar to this might be worked out for traffic. It is not sufficient to say that a certain pavement has so many tons of traffic per yard per year, as it can be easily understood that the passage of one truck weighing ten tons, with steel tires, over a pavement at a rate of four miles per hour, will have a very different effect on the pavement than ten different vehicles weighing one ton each with rubber tires at different velocities.

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[*] Paper presented at the 21st annual meeting of the Society for the Promotion of Engineering Education, Minneapolis, Minn.

[†] Consulting Engineer, Office of the President, Borough of Brooklyn, New York, N. Y.

What is necessary is to find by experiment the relation of the different kinds of traffic to a standard traffic unit. If such unit should be considered, for example, as a two-ton load, on four wheels with steel tires, passing over a pavement at the rate of four miles per hour, then all other vehicles, either heavier or lighter, could be measured by such unit. By experimenting with standard apparatus, the effect upon different pavements of different loads, at different speeds, with different tires, could be ascertained, and in such a way all traffic could be reduced to the standard unit, so that when traffic of a street is spoken of it would be given in units, as, say, 1,000 traffic units. This unit should relate to certain widths of pavement per year

The writer appreciates fully that it would not be a simple proposition to work out exact traffic conditions, even after the foregoing results had been obtained, as the observer must rate vehicles according to his judgment, which could not be absolutely accurate, but it would undoubtedly average pretty nearly correct in the long run, and it would be very much more nearly correct than anything that is being used at the present time.

The writer feels, therefore, that there are open to the highway engineer in municipal work opportunities for determining not only the properties of paving materials, both simple and compound, but also in their application, and that if his studies should result in simplifying the questions somewhat along the lines suggested herein, there would be a great advance in the paving art, and that the laying of pavements, as well as their selection for certain given streets, could be based upon scientific principles.

Good Roads in Lee County, North Carolina

By R. P. COBLE[*]

In February, 1912, the fourth year after its establishment by the General Assembly of North Carolina, Lee County, one of the smallest counties in the state, entered the ranks of the progressive counties in the good roads movement and voted $100,000 in bonds, which were sold at a premium of 4½ per cent.

The county owns its own equipment consisting of 50 mules and the necessary road machinery. This equipment is divided into three separate forces, two for grading and surfacing and one for clearing. By this method two separate roads are always in course of construction. At present, there is also a fourth force, which is graveling the roads already constructed. Two repair forces are maintained, so as to furnish immediate relief to those sections of the county that have not been reached by the improved roads. These work only the mail routes and most important rural roads.

A SECTION OF SAND-CLAY ROAD BETWEEN SANFORD AND JONESBORO, LEE COUNTY, NORTH CAROLINA.

Lee County is fortunate in having an abundance of gravel and other material so essential to the best results in road building. This material is so generally distributed that almost every mile of road in the county can be surfaced at very little expense. At the present writing, we have 23 miles of fine sand-clay and gravel roads, two of which are shown in the accompanying illustrations. The maximum grade on these roads is 4 per cent., and very few grades exceed 3½ per cent. The average cost of construction per mile, including engineering and superintendence is about $1,000, while in the eastern section of the county, where there is an abundance of sand, the cost per mile will be considerably less.

The road fund is placed at the disposal of the Lee County Highway Commission, a board consisting of seven members, each township in the county being represented. Some of these are elected for a term of six years, while others hold office for four or two years. This body has in its charge the entire road work of the county, and employs an engineer who acts also in the capacity of superintendent, besides employing foremen to superintend the actual construction work. It is the intention of this commission to provide every section of the county with improved roads, and to connect with the improved roads of the adjoining counties.

GREENSBORO-FAYETTEVILLE HIGHWAY BEFORE IMPROVEMENT

GREENSBORO-FAYETTEVILLE HIGHWAY AFTER GRAVELING.

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[*] Highway Engineer of Lee County, N. C.

AMERICAN ROAD BUILDERS' ASSOCIATION

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Through the courtesy of the publisher of "Good Roads," this page, each month, is devoted to the use of the American Road Builders' Association. It is solely in the interests of the Association, and it is the desire of the Executive Committee that all members feel that this space is their own, and that they contribute freely to it, not only as regards anything concerning the Association itself, but also that which will further the good roads movement. Besides the official announcements of the Association, there will appear on the page contributions by members, items of news concerning the Association activities and personal notes about its members. All contributions should be sent to the headquarters of the Association at 150 Nassau Street, New York, N. Y.

Executive Committee:
Geo. W. Tillson
R. A. Meeker
E. L. Powers

Concerning the London Road Congress and European Roads

Nelson P. Lewis, Chief Engineer of the Board of Estimate and Apportionment of New York, N. Y., who was one of the representatives of the City of New York and of the A. R. B. A. at the International Road Congress in London, has returned to New York.

Mr. Lewis remained for the International Congress on Cities at Ghent at which he represented the City of New York, and the time between the two congresses he spent in England and Scotland where he reports some good trout fishing.

Mr. Lewis called at the headquarters of the Association upon his return and expressed himself as greatly pleased with the courteous hospitality shown the American delegates to the road congress. He appeared very favorably impressed with the promptness and orderliness with which the various social events were carried out. While the resolutions submitted to the congress for its adoption were in many cases so modified and curtailed to meet the views of various delegates that there is little new or valuable in them in their final form, the opportunity afforded the visitors to observe the great improvement in the urban and rural roads of Great Britain since the last congress he regards as invaluable.

The unfortunate attitude of the United States towards these international meetings was frankly commented upon by Mr. Lewis in "Engineering News" for July 24.

He reports that the Congress at Ghent was devoted chiefly to the social aspects of city planning, but owing to the absence of interpreters, and to the fact that the program and papers were printed and discussed only in French, it was impossible for those not familiar with that language to derive any substantial benefit from them.

Geo. W. Tillson, Consulting Engineer to the Borough President of the Borough of Brooklyn, was also a delegate of the City of New York and of the A. R. B. A. at the London road congress. In an interview at the Association's office he expressed opinions agreeing fully with those of Mr. Lewis as regards the conduct of the meetings, but was, perhaps, more pronounced in his feelings regarding the conclusions reached, as it seemed to him that the delegates in their desire to be courteous refrained almost entirely from giving positive opinions, lest they differ from those of some of the other delegates, so that the conclusions were so general and indefinite as to be of but very little value.

After the adjournment of the congress, Mr. Tillson visited Scotland, Holland, Belgium, Switzerland, Germany, Austria and France, and while his studies were given principally to pavements he observed the roads in the different countries very carefully. He was much impressed with the roads in England and Scotland and was surprised to find that in building roads near Edinburgh by the mixing method the stone and tar were mixed at a central plant and allowed to remain sometimes a week, or even two, before being used. The stone was spread upon the street and rolled cold, but the results seem to be very satisfactory. He saw one street in the residential part of Edinburgh built in this manner that had been in use four years, with no repairs, and was practically in perfect condition. The traffic, however, was extremely light.

Roads in Germany and Austria were particularly good, as were those of Switzerland as could be seen from the trains.

FRENCH NATIONAL ROAD BETWEEN PARIS AND FONTAINEBLEAU—STONE BLOCK PAVEMENT IN GOOD CONDITION.

He was, however, much disappointed in the condition of the national roads of France, judging from the little he was able to observe. For instance, on an automobile trip from Paris to Fontainebleau, the route, after leaving the suburbs of the city was entirely over the national roads. The distance is about 50 miles, and as he returned by a different way from which he went he traveled about 100 miles over stone, bituminous macadam and water bound macadam roads. Approximately one-half of these roads were in good condition and the other half bad, and it did not seem to make much difference what the material was, the relative amount of good and bad was the same. He was told that all of the national roads leading out of Paris for a distance of 75 or 100 miles were practically in this condition, due to the heavy automobile traffic. This explanation did not seem satisfactory, as the stone roads were relatively in as bad condition as the others where a little work in relaying the blocks would have put them in first-class condition. He was forced to the conclusion that the maintenance of the roads of France has not been kept up to the high standard which he has been led to suppose existed several years ago. This conclusion, of course, however, was based simply upon this particular road, which one would naturally suppose to be as important as any that leads out of Paris.

Notes

Col. Edwin A. Stevens, State Highway Commissioner of New Jersey, has gone to Europe, where he will make a study of foreign roads and road building methods. He is expected to remain abroad for several weeks.

One of the European roads inspected by Major W. W. Crosby, of Baltimore, Md., Treasurer of the A. R. B. A., while abroad for the purpose of attending the International Road Congress in London, was the London-Folkestone Road, where experimental sections were put down some time ago by the Kent County Council, cooperating with the Road Board. A detailed report on these experimental sections, prepared for "Good Roads" by Major Crosby, is printed elsewhere in this issue.

W. A. McLean, formerly Provincial Engineer of Highways of the Province of Ontario, Canada, has been appointed a member of the new Highway Commission of that province.

D. B. Goodsell, Assistant Engineer, Bureau of Highways, Borough of Manhattan, New York, N. Y., one of the representatives of the A. R. B. A. at the Third International Road Congress in London last June, has returned.

Arthur H. Blanchard, Professor in charge of the graduate course in highway engineering at Columbia University, New York, N. Y., has been retained by the State Highway Department of Pennsylvania as Consulting Engineer on the appraisal of certain toll roads.

Paul D. Sargent, Assistant Director of the U. S. Office of Public Roads, Washington, D. C., has been appointed Chief Engineer of the new State Highway Commission of Maine. Mr. Sargent was the first State Highway Commissioner of Maine and served in that capacity until 1911, when he was succeeded by P. L. Hardison. Soon afterwards he went to the Office of Public Roads where he has since remained.

Samuel Hill, of Seattle, Wash., President of the A. R. B. A. and a delegate of that organization to the Third International Road Congress in London in June, returned from abroad early in August. After the close of the congress, President Hill spent some time studying road building in France, Germany, Belgium and England. President Hill brought back many photographs of European roads and road work, some of which are reproduced in this issue of "Good Roads" in the article on the reconstruction of the Fosseway in Nottinghamshire, England. While in England, President Hill inspected this road as well as a great many others, including the experimental sections on the London-Folkestone Road in Kent County.

CORRESPONDENCE

The Fixed Carbon Test for Bituminous Materials

Editor "Good Roads":

The question has often been asked by city and state engineers, as well as many producers of excellent asphalt and bituminous cements and road binders, what, if anything, has the "fixed carbon test" to do with the quality of these products for pavement and road construction? The answer is that it has nothing to do with the qualities of these materials. Fixed carbon is not a definite substance nor quality in any given coal or other material. It constitutes the results of an arbitrary test of the approximate portion of coal, which will remain and continue to burn and give heat after relatively light, volatile hydrocarbons have been partially burned away by flame. This test was devised solely for coal, by the committee on coal analysis of the American Chemical Society, and published in the Journal of the American Chemical Society, 1899, No. 21, p. 1116.

The test is made briefly as follows: One gram of coal is put in a "platinum crucible weighing 20 or 30 grams and having a tightly fitting cover. Heat over the full flame of a Bunsen burner for seven minutes. The crucible should be supported on a platinum triangle with the bottom 6 to 8 cm. above the top of the burner. The flame should be fully 20 cm. high when burning free, and the determination should be made in a place free from drafts. The upper surface of the cover should burn clear, but the under surface should remain covered with carbon."

It is therefore evident that the fixed carbon test has nothing to do with the quality or uses of asphalt, bitumens, asphalt cements and road binders. Burning and consequent destruction of the asphalt or bitumen proves nothing concerning the original condition and qualities before being burned. The qualities of the asphalt or other bitumens as used (not the burned products) are what are needed for cementing together and waterproofing the other materials in a pavement or road.

No two persons, in the same or different places, with the various allowed sizes of crucibles, different sized Bunsen heaters, different kinds and pressures of gas, different lengths and sizes of flames, different distances the crucibles stand above the burner, even aside from the personal factor or difference in the way different persons work, can get the same quantity of fixed carbon (ashed free) or otherwise from the same sample of coal or other substance. When this variable process is applied to an asphalt or bituminous substance, even more widely varying and discordant results are obtained. It cannot be used as a basis of comparison of asphalt and bituminous materials, nor as a proof of their good or bad qualities.

The attempted introduction of the fixed carbon test for coal into the asphalt industry has nothing to do with the determination of quality; nor can any minimum or maximum amount be set for this alleged test, between which all good asphalts and bitumens will come. Some good ones will be outside such limits, and some poor, worthless asphalts and bitumens will be inside any limits attempted to be established by fixed carbon requirements. This test is sometimes used by chemists simply as a small but imperfect indication, taken with other special chemical tests, to identify, if desired, an unknown or unnamed brand of asphalt, but has nothing to do with quality. This test should not be placed among the tests for quality of asphalt, nor any road building materials. The insertion of this test in any city, county, state or other specifications is purposely or unconsciously done, or caused to be done, by copying or otherwise from one or more persons or agents who thereby seek to include some, and exclude other brands of asphalts and road materials, which compete and are perfectly good for use.

The fixed carbon (coal test) should be ignored if still found in asphalt or bituminous specifications, and not enforced; not only on engineering, but also on legal grounds, that "the test does not apply to or establish any quality of the material necessary for the construction made or to be made," i. e., in this case it does not apply to refined asphalt, asphalt or bituminous cement or road binder for constructing and waterproofing roads or pavements.

J. W. HOWARD, C. E.

New York, N. Y.

Road Inspection Trip in Chautauqua County, N. Y.

Editor "GOOD ROADS:"

The wisdom and value of the county highway inspection plan inaugurated by County Superintendent Willis D. Leet of Chautauqua County in 1912, and reported in full in "Good Roads" at that time, was fully demonstrated and established by the second annual inspection made in this county under the same leadership, on Wednesday and Thursday, July 30 and 31, this year.

Good "improved roads" may depend upon competent engineering, technical skill, and honest contractors, but good dirt roads depend upon fundamental ideas of how to handle men, teams, steam rollers, road scrapers, and plain dirt; and it is a work in which mutual experience and the knowledge of what others doing the same kind of work have accomplished is of the utmost value. Superintendent Leet's inspection was not the cursory committee visitation, but a real inspection in which every supervisor in the county, 29 in all, and every highway superintendent, also 29 in all, were taken over the dirt roads, as well as the improved roads in every township of the county and given two days of opportunity to study each other and each other's roads.

The proof of the value of last year's trip and the demonstration of the wisdom of Mr. Leet's idea, was in the fact that the towns with poor roads last year had better roads, even "good" roads, this year, a notable achievement, and one commented on by every member of the party.

As a whole, the roads of the county were improved. Of over 200 miles ridden over, only a few stretches were poor. All were so much better than in the dark age days before the present uniform county system that to take the trip was a revelation of what system will accomplish. And the poor roads ridden over were poor for easily understood reasons, and lacked only the individual energy of an efficient town highway superintendent to be made good.

The inspection party left Jamestown on Wednesday morning, July 30, in 16 automobiles, and with about 80 persons in the party. They went over the route laid out as a county highway from Jamestown to Fredonia, two sections of which are now partly built and under contract, one with a brick roadway, the other with part brick, and part bituminous macadam on a concrete base. This last section has been badly delayed by difficult engineering conditions, but when completed by Contractor McNamara of Dunkirk, bids fair to be one of the best improved roads in the county. An old iron bridge improved by a roadway of creosoted wood blocks was noted with considerable interest during this part of the trip. This was near Charlotte Center. From Fredonia the route was over the old historic Buffalo-Cleveland military road, which is on a natural gravel formation and, although designated for brick paving, is, without improvement, one of the best roads in the world. The dinner stop was at Silver Creek.

The second half day was occupied by the trip from Silver Creek, through the eastern section of Chautauqua County, through beautiful and agriculturally perfect hills and valleys to Frewsburg, thence into Jamestown. The fruit lands of Hanover, and the dairy farms of Villenova, Cherry Creek, and Poland were equally admirable. The dirt roads were excellent, although very dusty. Long, straight stretches with uniform width, straight ditches, even crowning, evidence of good work with the scraper and the road hone, were commented on. Most of the culverts were of concrete, most of the approaches level, few roads were rutty, and none rough on this trip.

The bituminous surfaced concrete construction on the state road known as the southern tier route was reached at Waterboro at the Cattaraugus County line, and the route led over about four miles of this road. It has been severely criticised for poor concrete work, and many very bad places were found, with big patching jobs already done, although the road was built in 1912. More work is necessary if the road is to be kept from going to pieces in long stretches. This job was completed and paid for before the bad work was discovered. It was a discouraging sight to persons interested in having permanent work built as it was evident that the money paid for parts of this road was practically thrown away.

A few miles of tarred macadam, and a mile of water bound macadam, were better even than this concrete. Then after four miles of dirt road down the Cassadaga Valley, the brick road from Frewsburg to Jamestown was reached, and three miles of 12 and 14-ft. brick pavement was ridden over, every foot of which was as good as the best city pavement. It was a welcome change after the other kind of work on the Waterboro Hill Road.

The second day's trip was from Jamestown through the western section of the county. Seventy miles were covered before luncheon, which was served at the Chautauqua Assembly where the entire party was the guest of the Chautauqua Institution. Nearly 100 people were in the second day's party.

The trip was without incident except that the dirt roads along the south shore of Chautauqua Lake were found to be deplorably bad. Here heavy automobile travel over a road not sufficiently crowned and drained in the early work, and seriously neglected since July 1, has resulted in ruts and roughness hardly conceivable on what is one of the most used thoroughfares in the section. This is the main auto route between Jamestown and Chautauqua and Jamestown and Westfield, as well as a main market road into Jamestown, a city of 35,000 people. The complaint is equally bad against the towns of Ellicott, Busti and Harmony. The roads need crowning, need the stones removed, and need almost constant use of a road hone.

The town of Clymer had especially commendable dirt roads. French Creek town deserves even stronger commendation, for last year it was in this town that the worst roads of the trip were found. At Findley Lake the lakeside drive was especially fine, level, smooth and wide. This also is a much used automobile route. Through Ripley over the bold hills and down the escarpment into the Lake Erie Valley, fair roads, considering the difficulties, were encountered and once again on the Lake Erie Main Road in Ripley, a thoroughfare like a city asphalt street was found, although no work had been done on it except to properly grade and hone the natural gravel roadway.

Westfield's main road was excellent, and the historic Portage Road to Mayville and Chautauqua Lake showed excellent care up the steep grades which give a 900-ft. rise in five miles. In the town of Chautauqua, where last year the finest roads of the trip were found, this year there seemed a lack of attention. This was particularly noticeable inside the village of Mayville where ruts and roughness were as bad as anywhere on the 200-mile drive.

Two miles from Mayville is the world-famed Chautauqua Assembly, where each summer 40,000 visitors come for rest, recreation, and summer study under the lakeside groves, and in an atmosphere of scholarly quiet not equalled in any college town in America. Automobiles are barred from this summer city, but the good roads party was escorted through the grounds with apparently the whole 40,000 people out en masse to welcome the "highwaymen." Luncheon was served at the big summer hotel, and the freedom of the institution tendered the individual members of the party. This ended the trip.

Besides County Superintendent Leet, and the local officials, the party included Third State Deputy W. F. Wilson of Albany, and his assistant, Fred. Buck, and the county superintendents of Erie and Cattaraugus Counties; Messrs. Alexander Bird and H. L. Parsons, Division Engineer James A. Morrissey of Rochester, Supervisor J. C. Van Arsdale in charge of the dirt roads of the western division, Congressman Charles M. Hamilton, President Morgan Kent of the Jamestown Automobile Club, Hawley B. Rogers, manager of the Chautauqua County Farm Bureau, and a number of newspaper men.

Supervisor J. C. Van Arsdale summed up the trip at Chautauqua when he said: "I have yet to see a plan better worked out, or which has proven of more practical benefit than the trips of last year and this year. I know the dirt roads of every county in Western New York, and I can be frank and truthful in saying that the dirt roads of Chautauqua are not equalled in my district. This inspection, which I understand is wholly without cost to the county or the taxpayers, is proving to be worth thousands of dollars to every town in the county."

A. M. LOOMIS.

Jamestown, N. Y.

MEETINGS

Previously Reported

(Issues of Aug. 9, 16, 23 and 30.)

BOARDS OF COUNTY COMMISSIONERS OF PENNSYLVANIA.—State convention, Williamsport, Pa. Page 86, Aug. 23.

CHATTANOOGA-ATHENS-KNOXVILLE PERMANENT HIGHWAY ASSOCIATION.—Organization meeting, Chattanooga, Tenn., Aug. 14. Page 89, Aug. 30.

CLEBURNE, TEX.—Mass meeting. Page 86, Aug. 23.

COLBERT, OKLA.—Good roads meeting and picnic, Aug. 12. Page 90, August 30.

COLORADO-TO-THE-GULF HIGHWAY ASSOCIATION.—Clarendon, Tex., July 25. Page 78, Aug. 9.

COLORADO-TO-THE-GULF HIGHWAY ASSOCIATION.—Clayton, N. Mex., Aug. 28. Page 90, Aug. 30.

COOS COUNTY GOOD ROADS ASSOCIATION.—Coquille, Ore. Page 90, Aug. 30.

DENISON, TEX.—Good roads meeting. Page 90, Aug. 30.

FORT WORTH, TEX.—Meetings of various good roads associations and county officials associations, Aug. 7, 8 and 9. Page 86, Aug. 23.

GALVESTON, TEX.—Mass meeting, Aug. 17. Page 90, Aug. 30.

GEIGERTOWN GOOD ROADS ASSOCIATION.—Birdsboro, Pa., July 31. Page 81, Aug. 16.

GREAT WHITE WAY ASSOCIATION OF IOWA.—Annual outing, Pella, Ia., July 26. Page 78, Aug. 9.

HUNTSVILLE, ARK.—Mass meeting, Aug. 4. Page 81, Aug. 16.

NORTH CAROLINA GOOD ROADS ASSOCIATION.—Annual convention, Morehead City, N. C., July 31. Page 80, Aug. 16.

PACIFIC HIGHWAY ASSOCIATION.—Fourth Annual Convention, Vancouver, B. C., Aug. 11-13. Page 85, Aug. 23.

SPARTA, MO.—Mass meeting, Aug. 2. Page 81, Aug. 16.

WINCHESTER, ARK.—Good roads meeting, July 31. Page 81, Aug. 16.

COMING MEETINGS

Sept. 17-18.—National Paving Brick Manufacturers' Association.—10th Annual Meeting, Cleveland, Ohio. Secretary, Will P. Blair, 824-826 B. of L. E. Bldg., Cleveland, Ohio.

September 29-October 4.—American Road Congress.—Annual session, Detroit, Mich. Secretary J. E. Pennybacker, Colorado Building, Washington, D. C.

October 7-10.—American Society of Municipal Improvements.—20th Annual Meeting, Wilmington, Del. Secretary, A. Prescott Folwell, 15 Union Square, New York, N. Y.

October 22-23.—Southern Appalachian Good Roads Association.—Annual Convention, Asheville, N. C. Secretary, H. B. Varner, Lexington, S. C.

Nov. 10-11.—Georgia-Carolina Good Roads Congress—Augusta, Ga. Secy., J. C. Harper, 511 Dyer Bldg., Augusta, Ga.

November 10-15.—United States Good Roads Association.—Convention, St. Louis, Mo. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

December 9-12.—American Road Builders' Association.—10th Annual Convention, 4th American Good Roads Congress and 5th Annual Exhibition of Machinery and Materials, First Regiment Armory Bldg., Philadelphia, Pa. Secretary, E. L. Powers, 150 Nassau St., New York, N. Y.

February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

National Paving Brick Manufacturers' Association

A total attendance of about 400, including city engineers and other officials, paving contractors and paving brick manufacturers is expected at the tenth annual meeting of the National Paving Brick Manufacturers' Association at Cleveland, O., Sept. 17 and 18.

As announced in "Good Roads" for Aug. 9, the proceedings, other than those of the regular business sessions, will consist of tours of inspection over brick paved streets, and discussions, instead of a prearranged programme of written papers. The inspection tours will be made in automobiles provided for the purpose by the individual members of the association. The business sessions will be held in the mornings of the two days.

The reports of Charles J. Deckman, Will P. Blair and H. H. Macdonald, President, Secretary and Assistant Secretary respectively of the association will be read at these sessions.

In accordance with suggestions adopted at recent meetings of the brick committees of the American Society of Municipal Improvements and the American Society for Standardizing Paving Specifications that a schedule of study and investigation at paving brick plants arranged by the National Paving Brick Manufacturers' Association would be desirable, committees of the two societies will meet at the Hotel Statler, Cleveland, at 8 a. m., Sept. 15, and will spend that day and the day following inspecting brick paving plants. They will be the guests of the National Paving Brick Manufacturers' Association during the annual meeting.

American Highway Association

A tentative program of the "Third American Road Congress," to be held at Detroit, Mich., September 29 to October 4, under the auspices of the American Highway Association, the American Automobile Association and the Michigan State Good Roads Association, has been issued. The day sessions of the congress are to be held in Wayne Gardens, where there will also be an exhibition of road machinery and materials and exhibits by the U. S. Office of Public Roads and various states. The evening sessions and meetings of the local associations participating in the meeting, the committees of the congress and the different associations, will be held at the Hotel Pontchartrain and other hotels.

According to the tentative program, the first session of the congress will be opened at 10 a. m., Monday, Sept. 29, by Logan Waller Page, President of the American Highway Association and of the congress. Among the speakers scheduled for this session are Governor Woodbridge N. Ferris of Michigan, Mayor Oscar B. Marx of Detroit, President Laurens Enos of the American Automobile Association, and President Page.

The principal event of the afternoon session on Monday is expected to be the reading of an address written by President Woodrow Wilson. It is also stated that plans are being considered for a garden party late in the afternoon in honor of guests of the congress, which will be followed by banquets and entertainments by various Detroit organizations.

The morning session on Tuesday, Sept. 30, is to be held under the auspices of the American Automobile Association and will be devoted to the subjects of national aid and national highways. Frank E. Doremus, M.C., will preside and make the opening address. Other speakers scheduled to take part in this session are Jonathan Bourne, Jr., Chairman, Joint Congressional Committee on Federal Aid in the Construction of Post Roads; Senator Claude A. Swanson of Virginia, a member of the joint committee, and Congressman D. W. Shackleford, Chairman of the Good Roads Committee of the House of Representatives. The program for this session also includes addresses by representatives of the Lincoln Highway Association, and the appointment of a committee to prepare resolutions for presentation to the United States Congress.

The afternoon session on Tuesday will be under the auspices of the American Bar Association and will be devoted to the subjects of state legislation and management. The speakers whose names appear on the program for this session are Wm. D. Sohier, Chairman of the Massachusetts State Highway Commission; President John A. McIlhenny of the United States Civil Service Commission; State Highway Commissioner James R. Marker of Ohio, and Chief Engineer Henry G. Shirley of the Maryland State Roads Commission.

Tuesday evening is to be given up to entertainments, the details of which are to be announced later.

The session on Wednesday, Oct. 1, designated as the "Construction and Maintenance Session," will be under the auspices of the American Highway Association. The opening address will, according to the program, be made by State Commissioner of Highways John N. Carlisle of New York, who will preside. It is announced that the papers at this session will be read by title only.

On Wednesday evening a boat ride will be given to which delegates and members attending the congress are invited.

The morning session on Thursday, Oct. 2, "Road Users' Session," will be under the auspices of the American Automobile Association, Geo. C. Diehl, Chairman of the Good Roads Board of the A. A. A., presiding. The opening address is to be made by Mr. Diehl and the remainder of the program is to be announced later.

The afternoon session on Thursday, designated as the "Finance Session," will be under the auspices of the American Bankers' Association, with Wm. G. Edens, President of the Illinois Highway Improvement Association, presiding. The papers and addresses at this session are to deal with the subjects of road financing and accounting, among the speakers being S. E. Bradt, Vice President of the First National Bank of De Kalb, Ill., and H. P. Gillette, Editor-in-Chief of "Engineering and Contracting."

On Friday, October 3, designated as "Michigan Day," the proceedings are to be under the auspices of the Michigan State Good Roads Association. The session will begin at 10 a. m., with President P. T. Colgrove of the Michigan State Good Roads Association presiding. Among the speakers scheduled are Governor Ferris of Michigan; Senator Chas. A. Townsend of Michigan; President Jesse Taylor of the Ohio Good Roads Federation; State Highway Commissioner Frank F. Rogers of Michigan; Chairman Wm. Bryant of the Good Roads Association of Kalamazoo County, Michigan; Frank N. Sparks, Editor of the "Grand Rapids Herald," and Frank Hamilton.

In the evening, a meeting of the American Highway Association will be held at the Hotel Pontchartrain for the election of officers, the consideration of reports and other business.

At the final session, at 10 a. m., Saturday, Oct. 4, at which Dr. Jos. Hyde Pratt, State Geologist of North Carolina, will preside, the report of the Committee on Resolutions will be considered and the business of the congress closed.

Among the papers and discussions listed in the tentative program are the following:

"The Labor Problem in Road Construction," by State Highway Commissioner P. St. J. Wilson of Virginia; the discussion to be opened by Chief State Engineer W. E. Atkinson of Louisiana; "Systematizing the Purchase of Road Materials and Equipment," by Chief Engineer Henry G. Shirley of the Maryland State Roads Commission; "Unsurfaced Roads," by State Highway Engineer W. S. Keller of Alabama, discussion opened by State Engineer Geo. W. Cooley of Minnesota; "Gravel Roads, Their Construction, Maintenance, Cost and Special Treatment," by State Superintendent of Highways S. Percy Hooker of New Hampshire, discussion opened by State Highway Engineer H. L. Bowlby of Oregon; "Treatment of Worn-out and Raveled Surfaces," by State Highway Commissioner E. A. Stevens of New Jersey, discussion opened by State Commissioner of Public Roads Robert C. Terrell of Kentucky; "Bituminous Macadam, Construction and Maintenance," by Chief Engineer S. D. Foster, Pennsylvania State Highway Department, discussion to be opened by Highway Commissioner W. A. McLean of the Province of Ontario, Canada; "Brick Roads," by County Engineer James M. McCleary of Cuyahoga County, Ohio, discussion opened by Chairman R. Keith Compton of the Baltimore (Md.) Paving Commission; "Concrete Roads," by State Highway Commissioner Frank F. Rogers of Michigan, discussion opened by State Highway Engineer Paul D. Sargent of Maine; "Selection of Road Materials," by Director L. W. Page of the U. S. Office of Public Roads; "Drainage Structures," by State Highway Engineer A. R. Hirst of Wisconsin, discussion to be opened by Prof. T. H. MacDonald of Iowa State College; "California's $18,000,000 State Highway System," by State Highway Engineer A. B. Fletcher of California; "Highway Accounting with Especial Reference to Maintenance," by Halbert P. Gillette, Editor-in-Chief, "Engineering and Contracting;" "The Organization and Management of Working Forces," by State Highway Engineer A. N. Johnson of Illinois; "Contract Law," by Wm. Bowman, New York, N. Y.; "The Protection and Upkeep of Road Equipment," by Daniel J. Hauer, New York, N. Y.; "The Merit System in Road Management," by President J. A. McIlhenny of the U. S. Civil Service Commission; "Financing Road Improvement," by President Wm. G. Edens of the Illinois Highway Improvement Association; "Bond Issues for Road Improvement," by Vice President S. E. Bradt of the First National Bank of De Kalb, Ill.; "The International Congress and the Roads of England, France and Germany," by Chairman Wm. D. Sohier of the Massachusetts State Highway Commission; "Economics of Road Improvement," by Secretary J. E. Pennybacker of the American Highway Association; "Dirt Roads and Politics," by Former State Highway Commissioner Chas. P. Light of West Virginia.

Georgia-Carolina Good Roads Congress

The Georgia-Carolina Good Roads Congress, the membership of which comprises highway authorities of Georgia and South Carolina and individuals favoring highway improvement in both states, will be held at Augusta, Ga., Nov. 10 and 11, during the Georgia-Carolina Fair.

Invitations have been extended the Governor of Georgia and the United States Senators of both states and to others interested in the extension of road improvement. A road machinery exhibition will be held in connection with the congress and demonstrations in road work will be made.

E. J. Watson, Commissioner of Agriculture of South Carolina is President of the Congress; Judge William F. Eve, President, Georgia Federation of Road Authorities, and J. D. Price, Commissioner of Agriculture of Georgia, are Vice Presidents, and J. C. Harper of Augusta, Ga., is Secretary.

A meeting in celebration of the completion of the "Rainbow Route," the first gravel highway to be built across the Rocky Mountains in Colorado, will be held Sept. 24 and 25 at Pueblo. The meeting will be made the occasion of the inauguration of a campaign for highway improvement throughout the state with especial reference to the construction of better roads in the more remote farming and mining districts and to the scenic resorts. A number of automobile excursions will be conducted from various points to Pueblo before the meeting. Governor E. M. Ammons of Colorado, and others, will make addresses.

PERSONAL NOTES

Jacob Serson, Provincial Superintendent of Bridges of British Columbia since 1898, died at Nelson, B. C., Aug. 14.

Fred Bennett has been appointed Acting Highway Engineer of Bexar County, Tex., succeeding George D. Marshall, who recently resigned from that office.

Frank L. Dormant, City Engineer of Houston, Tex., has resigned. Mr. Dormant, who has been City Engineer for the past two years, will be retained by the city in an advisory capacity. He will resume consulting practice.

NEW PUBLICATIONS

HARD ROADS AND PERMANENT BRIDGES.—By Daniel B. Luten Reprint from the Proceedings of the Iowa Engineering Society for 1913. Paper; 6x9 ins., 12 pp. and cover; illustrated.

This paper by Mr. Luten is a general discussion of the requirements of modern highway bridges, with especial reference to reinforced concrete arches. It includes a sample estimating sheet for such bridges; sample plans for general plan lettings, including longitudinal and transverse sections, elevation and half plan, together with a discussion of this method of awarding contracts and suggested clauses to be added to the usual specifications. The illustrations, besides the plans, are of a single-span concrete arch bridge at Ripley, N. Y., and of a 12-span concrete arch bridge over the Maumee River at Waterville, Ohio.

TYPICAL SPECIFICATIONS FOR THE FABRICATION AND ERECTION OF STEEL HIGHWAY BRIDGES.—Circular No. 100, Office of Public Roads, U. S. Department of Agriculture, issued August 19, 1913. Paper; 6x9 ins., 25 pp.

In the past, according to the letter of transmittal printed inside the front cover of this publication, many steel bridges have been very poorly constructed, because, it is believed, highway officials have lacked information concerning the proper specifications for the work. Therefore, it is stated, specifications were prepared in the Office of Public Roads in order to furnish a suitable guide for local highway officials in fixing the requirements to which bridge construction should conform and are printed as a circular of the office in order to make the information more readily available. The contents of the book consist of a set of specifications designed to cover the entire work of fabricating and erecting steel highway bridges. An idea of the scope of the specifications may be obtained by a perusal of the several sub-heads, which are as follows: Description of Project; General; Loads; Proportions and Unit Stresses; The Floor System; Details of Design and Construction; Workmanship; Materials; Painting; Concrete Masonry; Inspection and Testing; Erection; Supplementary.

BOOK NOTICE

CONCRETE ROADS AND PAVEMENTS.—By E. S. Hanson, Editor, "Cement Era." Cloth, 5x7½ ins., 227 pp.; illustrated. The Cement Era Publishing Co., Chicago, Ill. $1.00.

This work, according to Mr. Hanson's preface, is in large part a compilation in which an effort has been made to collect in convenient handbook size the available data on the subject of concrete road construction. The subject is treated in thirteen chapters and twelve appendices. The chapter headings are as follows: Concrete as a Road Material; The Construction of Concrete Roadways; The Roads of Wayne County, Michigan; Cost of Concrete Roads in Illinois; Other Examples of Concrete Roads; Some Data on City Pavements; Reinforced Concrete Pavements; Concrete in Combination with Other Materials; Patented Concrete Pavements; The Theory and Practice of Joints; Some Tests on Concrete as a Roadway Material; Bridges and Culverts; Sidewalks, Curbs and Gutters. The appendices consist of specifications, and include those for concrete roads and pavements advocated by the National Association of Cement Users; those in use in Wayne County, Michigan, in Mason City, Iowa; the specifications of the Illinois Highway Commission; the specifications for Blome Granitoid pavement and for Blome Granocrete pavement; for Bitustone pavement; Dolarway pavement and Hassamite; the typical specifications of the U. S. Office of Public Roads for reinforced concrete bridges and culverts, and the specifications of the National Association of Cement Users for sidewalks, curbs and gutters. Besides Wayne County, Michigan, and Illinois, other places cited for the work done in the construction of concrete roads are Milwaukee County, Wis.; Winona County, Minn.; California; Ohio; Washington; Ada County, Idaho; and Michigan. Among the cities using concrete pavements and referred to by Mr. Hanson are: Mason City, Ia.; Ft. Smith, Ark.; Lynn, Mass.; Marshalltown, Ia.; Alpena, Mich.; Waterloo, Ia., and Aledo, Ill. The illustrations consist principally of halftones showing concrete roads and their construction. These include illustrations of the methods of construction followed in Wayne County, Michigan, in Illinois, and in Milwaukee County, Wisconsin; illustrations of Hassam, Dolarway, Granocrete, Bitustone and other pavements, and a number of miscellaneous halftones and line cuts.

REPORTS

PROPOSED CHANGE OF MAP FOR RIVERSIDE DRIVE EXTENSION.—Report and plans submitted to Geo. McAneny, President of the Borough of Manhattan, by Arnold W. Brunner and Frederic Law Olmsted. Paper; 7x10¼ ins., 28 pp. and cover; insets; illustrated.

This report, which is noted at length alsewhere in this issue, comprises the recommendations made by Messrs. Brunner and Olmsted for the extension of Riverside Drive northerly from its present termnus to the Borough of the Bronx. The report takes up the suggested plans in considerable detail and includes general recommendations to be followed in carrying out the plans proposed. The illustrations consist of six drawings showing proposed treatments at various points along the projected extension. The report also includes two insets consisting of plans of the extension. One of these shows the present conditions and the proposed improvement from 155th street to the Harlem River, and the other shows further details of the drive and connections north of Dyckman street.

THIRD ANNUAL REPORT OF THE ROAD BOARD OF GREAT BRITAIN. For the year ending March 31, 1913.—Paper, 8½x13 ins., 78 pp.

This report covers the operations of the British Road Board for the past fiscal year, and includes a large mass of statistical data relative to the work. It consists of an 8-page report and 19 appendices, which occupy the remaining 70 pages. The report proper is devoted to brief statements of financial affairs and an explanation of the method of administering the work of the Board. The appendices cover the details and consist largely of statistical tables. They are as follows: (1) Summary of Applications for Advances, April 1, 1912, to March 31, 1913; (2) List of Grants Made, April 1, 1912, to March 31, 1913; (3) List of Loans Made, April 1, 1912, to March 31, 1913; (4) Summary of Grants and Loans Made to March 31, 1913; (5) Expenditures on Roads in England and Wales, Scotland and Ireland, from 1909 to 1910; (6)

Expenditures on Roads in England and Wales, Scotland and Ireland, 1910 and 1911; (7) Expenditures on Roads—Maintenance Expenditure (a) per Pound of Assessable Value and (b) per Head of Population; (8) Expenditure on Roads—Comparative Table for Three Years, England and Wales, 1909-11; (9) Expenditure on Roads—Comparative Expenditure on Maintenance of Roads in England and Wales, outside London and outside County Boroughs in Years 1890, 1902, 1909, 1910 and 1911; (10) Specimen Form of Summary of Statistics of Traffic; (11) Traffic Statistics; (12) Statement of Amounts Paid by the Exchequer to the credit of the Road Improvement Fund each month to March 31, 1913; (13) Abstract Account of the Receipts into and Payments out of the Road Improvement Fund from April 1, 1912, to March 31, 1913; (14) Balance Sheet at March 31, 1913; (15) Loans Account; (16) Investments Account for Year ending March 31, 1913; (17) Statement of Outstanding Loans at March 31, 1913; (18) Investment and Credit Balances; (19) Copies of Correspondence with London County Council in regard to London Western Approach Road.

ANNUAL REPORT OF THE CITY ENGINEER OF PORTLAND, OREGON, FOR THE YEAR ENDING DECEMBER 31, 1912. —Paper; 6x9 ins.; 88 pp.

This report, submitted to the Mayor and Council of the city of Portland by City Engineer T. M. Hurlburt, covers the work of the City Engineer's department, including pavements, sidewalks, sewers, etc., during the year of 1912. Most of the data are contained in tabular statements showing various features of the work. Among the tables are a table showing the lengths of various kinds of roadways in the city, the amounts and costs of street work done during 1912, summaries of contracts awarded and in force, and similar information. There is also included a report of the chemical testing laboratory, covering the work done with street and other materials.

NEW MACHINERY AND APPLIANCES

Semi-Portable Bituminous Mixing Plant

In order to meet the demand for a bituminous mixing plant of greater capacity than the ordinary portable plant, yet capable of being moved if necessary, there has recently been designed and placed upon the market a semi-portable plant, one of which has been purchased by the city of Springfield, Mass.

The plant, which is shown in the accompanying illustration, consists of four units—a portable boiler and engine, a portable single-drum drier, a portable melting tank and a mixing tower, all of which are so arranged as to be readily taken down, moved and reassembled at a new location.

The power plant, consisting of the portable boiler and engine, is designed to deliver power considerably in excess of that ordinarily required, in order to insure certainty of operation and to permit running the plant above its normal capacity if it is so desired. The boiler is of the horizontal, locomotive type, rated at 60 HP., with a 55-HP. horizontal engine placed on top of the boiler shell. The boiler and engine are mounted on four wide-tired iron wheels.

SEMI-PORTABLE BITUMINOUS MIXING PLANT BUILT BY THE IROQUOIS IRON WORKS.

The melting kettle, which is shown in the foreground in the illustration, is a self-contained unit mounted on three 6-in. I-beams of heavy section to permit its transportation. It has a capacity of 1,556 gals., and is arranged for either steam or air agitation of the melting material, steam being ordinarily used, but an air installation substituted if the purchaser desires.

The drier is of the standard Iroquois type. The drum is 40 ins. in diameter and 20 ft. long, and is contained in a firebrick and asbestos lined steel setting, with firing chamber, double roof, elevators and other accessories. The whole apparatus is a self-contained unit mounted on steel axles and wheels.

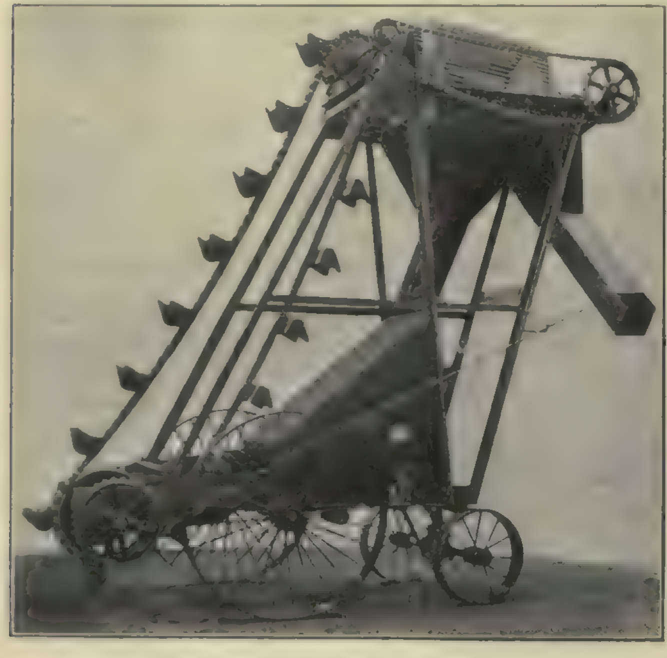
The mixing tower consists of four main columns, supporting on I-beam frames the necessary platforms for carrying the machinery. It is bolted together to facilitate dismantling and re-erection. It carries a standard 9-cu. ft. Iroquois steam jacketed mixer, a sand bin, a rotary screen and cradle, a dust collector and the necessary accessories, including weighing box and scale for the mineral aggregate, elevators, bucket and scale for the bituminous material, etc. The mixer is equipped with two sets of shafts and teeth in order to permit the preparation of any of the ordinary bituminous mixtures required in road and street work. The sand bin has a total capacity of 218 cu. ft., and is divided into two compartments. Directly over the sand bin, which is supported between the upper legs of the tower, the rotary screen and cradle are mounted. These are arranged to separate the mineral aggregate, the jacket being adjustable for the various sizes required. The dust collector delivers the dust above the top of the mixer so that it is available for use as filler.

The drier has a capacity for handling a cold sand mixture of the composition required for the usual sheet asphalt surface mixture, containing not more than 5 per cent. of moisture, at air temperature and delivering it to the conveyors at 350° F. at the rate of 6 tons per hour of continuous operation The mixer has a capacity of something over twice that of the drier, so that it is possible to double the capacity of the plant by installing an additional drier unit and an additional kettle unit. The manufacturers rate the capacity of the plant at 75 sq. yds. of 2-in. sheet asphalt surface mixture per hour, or 750 sq. yds. per 10-hour day. The capacity, it is stated, is considerably greater when the coarser aggregates required for bituminous macadam or concrete are being used.

The plant was designed at the Iroquois Works of the Barber Asphalt Paving Co., of Philadelphia, Pa., and is built at the Iroquois Works, Buffalo, N. Y.

Portable Loading Machine

A labor saving device, which has lately been adopted by road contractors, is the portable machine for loading wagons. The portable wagon loader was originally designed for loading coal from ground storage into wagons, but has been successfully employed for broken stone, gravel and sand and other materials transported in street and road work.



LINK-BELT WAGON LOADER.

The accompanying illustration shows a Link-Belt loader which is a slight modification of the standard machine of that make. It is owned by the Cranford Co., of Brooklyn, N. Y., for whom it was especially designed for reclaiming the stone from old macadam. The machine consists essentially of a bucket elevator and rotary screen operated by a 9 HP. gasoline engine through a chain and sprocket drive, two loading chutes and the necessary operating and controlling devices, all mounted on a steel framework of angles supported on four wheels. These features are the same, in general, in the standard machine made by the manufacturer and in the several modifications. These special forms of the loader differ in certain details of construction and operation, some of the principal modifications being in the arrangement of the chutes, differences in the chains and buckets of the conveyor, the addition of a traction device for moving the loader under its own power and the use of either a gasoline engine or an electric motor.

In operating this particular machine in repaving, the old macadam is shoveled into a belt conveyer trailer used as an auxiliary to the loader. The trailer consists of a wagon-like body mounted on wheels and having for a bottom an endless belt, slightly cupped. From this the material is carried to the top of the loader by the bucket elevator and discharged to the rotary screen. Dirt and other fine materials are screened out and delivered through one of the chutes, while the stones come out of the end of the screen and are discharged through the other chute. By the use of the trailer the necessity of a high lift by the shovelers is avoided, with a consequent saving.

This machine is so arranged that the trailer can be disconnected, the rotary screen at the top removed and the two chutes replaced by one direct chute. When this has been done material such as stone, sand or gravel can be loaded into wagons from storage piles on the ground, the machine in that case operating in the usual way. It is stated that with three men on the storage pile and one man to operate the loader, 2-in. stone can be loaded from ground storage piles into motor trucks at a rate of about 35 tons an hour. This is said to effect a saving of about 60 per cent. over hand-shoveling and to permit more economical operation of the trucks.

The machine is known as the Link-Belt wagon loader and is manufactured by the Link-Belt Co., of Chicago, Ill.

Two Dumping Trailers

The increasing use in road and street work of motor trucks and tractors has created a demand for cars or wagons for use as trailers. Two new pieces of equipment of this type are illustrated herewith.

The trailer shown in Fig. 1 is of the four-wheeled type and is designed for use with a motor truck and is provided with a stub pole coupling attachment. It has a capacity of 120 cu. yds., and is equipped with Timken roller bearings and wheels of the Sarven type. The body is of wood, braced as shown, the angles at the top of the sides being 3 ins. by ⅝ in. The front gear is of special construction and is mounted on semi-elliptical springs. At the rear, coil springs of 1-in. material are used. The dumping device is shown in the illustration. The trailer is known as the Special Watson Trailer and is supplied, if desired, without the front wheels and the lower part of the front gear, for use with tractors designed to haul two-wheeled trailers.

Fig. 2 shows a trailer designed especially for use with tractors. It is of the two-wheeled type, the one in the illustration having a capacity of 5 cu. yds.

Both trailers are manufactured by the Watson Wagon Co., of Canastota, N. Y.

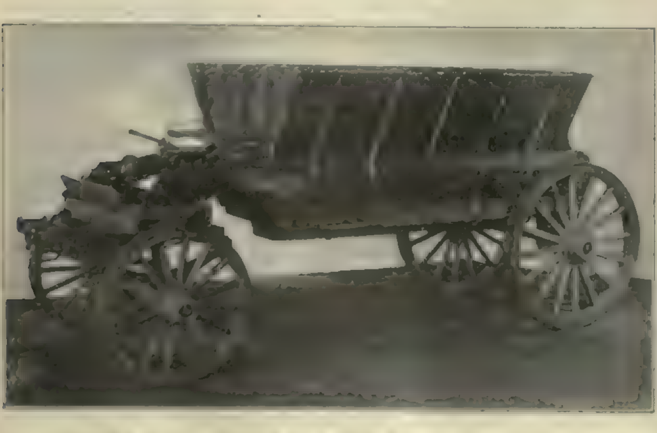


FIGURE 1.—4-WHEELED WATSON TRAILER.

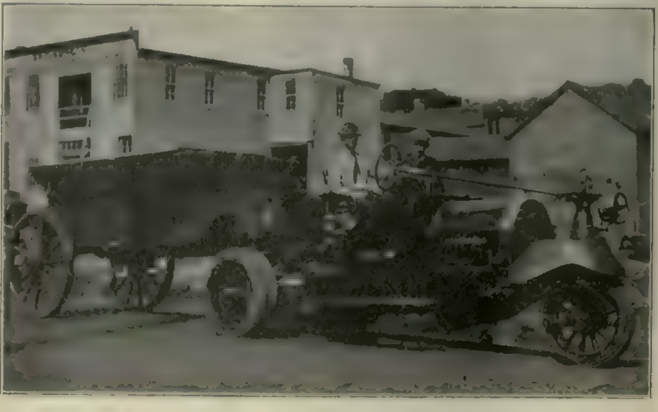


FIGURE 2.—2-WHEELED WATSON TRAILER IN USE.

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Copy for advertisements of which proofs are to be submitted to advertisers should reach the New York office as follows: For insertion in the first issue of the month, by the fifteenth of the preceding month; for other issues, by noon on Thursday of the week before date of issue.

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Apportion New York State Highway Fund

State Commissioner of Highways John N. Carlisle of New York has completed the apportionment among the counties of the $50,000,000 authorized by the voters of the state at the general election in November of last year for highway construction and maintenance. Under the terms of the referendum the distribution is made according to population, mileage of public highways and area of the several counties. Of the total amount $20,000,000 will be used for the construction of state highways and $30,000,000 for the construction of county highways.

A statement of the apportionment, showing the name of each county, the amount apportioned for state roads and that apportioned for county roads therein follows.

Albany, $427,140.80, $640,711.20; Allegany, $360,388.80, $540,583.20; Broome, $335,741.20, $503,611.80; Cattaraugus, $445,184.00, $667,776.00; Cayuga, $328,913.40, $493,370.10; Chautauqua, $471,615.80, $707,423.70; Chemung, $210,981.60, $316,472.40; Chenango, $320,997.20, $481,495.80; Clinton, $335,462.80, $503,194.20; Columbia, $274,557.00, $411,835.50; Cortland, $196,653.60, $294,980.40; Delaware, $478,713.60, $718,070.40; Dutchess, $378,309.00, $567,463.30; Erie, $1,113,762.20, $1,670,643.30; Essex, $417,931.20, $626,896.80; Franklin, $414,109.00, $621,163.50; Fulton, $205,458.60, $308,187.90; Genesee, $202,593.00, $303,889.50; Greene, $227,046.80, $340,570.20; Hamilton, $276,780.40, $415,170.60; Herkimer, $440,495.20, $660,742.80; Jefferson, $557,582.80, $836,374.20; Lewis, $331,292.40, $496,938.60; Livingston, $253,638.80, $380,458.20; Madison, $269,150.40, $403,725.60; Monroe, $640,241.40, $960,362.10; Montgomery, $188,144.60, $282,216.90; Nassau, $300,907.00, $451,360.50; Niagara, $294,038.80, $441,058.20; Oneida, $593,113.40, $889,670.10; Onondaga, $552,841.20, $829,261.80; Ontario, $278,783.00, $418,174.50; Orange, $423,662.20, $635,493.30; Orleans, $163,577.00, $245,365.50; Oswego, $392,336.00, $588,504.00; Otsego, $391,710.20, $587,565.30; Putnam, $96,457.20, $144,685.80; Rensselaer, $388,010.80, $582,016.20; Rockland, $130,796.60, $196,194.90; St. Lawrence, $780,977.80, $1,171,466.70; Saratoga, $337,699.00, $506,548.50; Schenectady, $199,412.00, $299,118.00; Schoharie, $232,372.00, $348,558.00; Schuyler, $132,433.40, $198,650.10; Seneca, $156,522.60, $234,783.90; Steuben, $577,806.00, $866,709.00; Suffolk, $471,556.20, $707,334.30; Sullivan, $350,223.60, $525,335.40; Tioga, $201,217.40, $301,826.10; Tompkins, $210,735.80, $316,103.70; Ulster, $456,570.20, $684,855.30; Warren, $263,379.60, $395,069.40; Washington, $315,420.80, $473,131.20; Wayne, $273,417.20, $410,125.80; Westchester, $577,888.00, $866,832.00; Wyoming, $217,383.60, $326,075.40; Yates, $135,865.80, $203,798.70.

New Highway Legislation in Wisconsin

The Wisconsin State Legislature, during its present session, enacted an amendment to the existing state highway laws extending the provisions of the state aid law to villages and cities of the fourth class, having a population of 5,000 or less.

Section 3 of the existing law provides for the selection by the county boards of commissioners of what are known as "county systems of prospective state highways," including main traveled highways, beginning at the corporate limits of county seats and the various market towns and at railroad stations. The towns and counties pay 66 2-3 per cent. of the cost of improving these roads and the state the remaining 33 1-3 per cent.

The amendment enacted this year provides that the main streets in villages and cities of the fourth class, directly connecting portions of roads in the county system of prospective state highways, shall be added to the system.

Money for state aid improvements may be voted by the city council or village board, without the formality of a special election.

Assistant Engineers of the Maine State Highway Department

Parker L. Hardison and Irving W. Barbour have been appointed assistant engineers with the recently organized State Highway Department of Maine. Mr. Hardison, who was State Highway Commissioner of Maine between February, 1911, and July, 1912, will have charge of state aid roads, and Mr. Barbour will have charge of the intercounty highways forming the state trunk line system authorized by the law passed at the last session of the State Legislature.

Mr. Barbour is a native of Portland, Me. He was City Engineer of Deering, Me., for some time and after the annexation of that city to Portland was connected with the Portland Department of Public Works. He was later an engineer on the staff of the Maine State Highway Department, leaving that office to accept an appointment as engineer with the U. S. Office of Public Roads. He retained the latter position until Sept. 1 of this year, when his present appointment became effective.

State Highway Route in California Selected

The Advisory Board of the California State Department of Engineering has accepted the State Highway Commission's selection of a state highway route between Fresno and Bakersfield.

This is said to insure the most direct route for the main trunk line of the state highway system between Sacramento and San Diego. The distance between Fresno and Bakersfield by the route designated is 67 miles. Laterals will be built to Visalia, Hanford and Porterville.

Examinations for County Superintendents of Highways in Illinois

Examinations will be held on Oct. 19 at various points in Illinois to secure eligibles for the office of County Superintendent of Highways in the several counties of the state.

The office was created by the law enacted at the last session of the Legislature. According to the terms of the measure, incumbents of the office are selected by competitive examination from lists of three to five names submitted by the boards of county commissioners. The State Highway Commission has adopted a ruling to the effect that in counties of more than 30,000 population, the County Superintendent of Highways must be a competent civil engineer and pass the state test as such.

It is expected that appointments will be made about Nov. 15.

Armour & Co. of Chicago, Ill., have offered to donate a right of way through their property in Minneapolis, Minn., and to construct a boulevard through the tract which is about 1½ miles wide.

More than three miles of concrete walks have been built in the town of Wills Point, Tex., during the past five months. A large part of the work was done voluntarily by the property owners.

The work of macadamizing a section in Clayton County, Ia., of the North Iowa Pike, an old military road running between McGregor, Ia., and Sioux Falls, S. D., will be commenced during the coming fall.

The Board of County Commissioners of Salt Lake County, Utah, has decided to call a special election for the purpose of voting on an issue of highway bonds to the amount of $1,000,000.

The road commissioners of Lindale Precinct, Smith County, Tex., have awarded contracts for the construction of 75 miles of sand-clay roads. The cost will be paid from the proceeds of a bond issue recently voted.

The governors of 22 states in attendance at the House of Governors at Colorado Springs, Colo., together with members of their staffs, on Aug. 29, made a tour of inspection of the section of the Lincoln Highway running through Ute Pass and of the Colorado Springs-Canon City Highway.

According to figures compiled by the Department of Public Works of Cleveland, O., 139 streets in that city will be paved next year. The greater portion of this work will be new construction, only a small amount of repaving being contemplated. It is stated that concrete will be used for the first time in paving the streets of the city, the use of that material for paving being heretofore confined to park drives and boulevards.

Bids Asked for New York State Road Work

State Commissioner of Highways John N. Carlisle of New York is advertising for bids, to be opened Sept. 26, for the improvement of 12 state and county highways.

Practically all the contracts for which bids are asked at this time are for the improvement of streets in cities and villages forming connecting links in the state road system. Most of the construction will be of brick.

New Specifications for Street Work in Los Angeles, California

At a recent conference between the Board of Public Works and the Committee on Public Works of the City Council of Los Angeles, Cal., it was decided that an amendment should be made to the specifications for street improvement.

Heretofore streets which have been graded, oiled and graveled by real estate operators and promoters of subdivision enterprises have been accepted as improved streets. In future such streets will be classified as merely graded, and in order to be accepted by the City Engineer must be surfaced with some material provided for in the specifications.

This action was taken on account of the alleged expense of maintenance of oil and gravel streets. About 25 petitions for street improvement are being held pending the completion of new specifications.

The contract for testing materials for use in paving the streets of Dallas, Texas, has been awarded to the Pittsburg Testing Laboratory.

The General Improvement Committee of the Youngstown, O., City Council has adopted plans for a new viaduct at E. Federal St. The estimated cost is $250,000.

The City Council of St. Catherines, Ont., at a recent special meeting authorized an expenditure of $54,398.56 for the purpose of constructing bitulithic pavement on Queenston and King Streets.

The city of Nuremburg, Germany, has adopted a program of municipal improvements for the coming year which involves an expenditure of over $2,000,000. Of this amount, $155,000 is designated for street paving.

The city of Madison, Wis., will have expended about $150,000 in new street construction when the work planned for the current year is completed. Of this amount $30,000 has already been expended in laying asphalt pavement on two streets. The plans for all the other streets which have been or will be improved during the remainder of the year, call for macadam construction.

The new city charter of Cleveland, O., contains a section which materially shortens the time required by the City Council to enact paving legislation. Heretofore four separate ordinances have been necessary to secure the paving of a street after grading. Under the terms of the new charter a board of assessment revision, consisting of the mayor, the director of law, the director of finance, the director of public service and the president of the council is created. This board will meet weekly and hear all claims and objections regarding paving and other improvements for which special assessments are made. Under this method two resolutions by the council will be sufficient to authorize proposed improvements. The new charter also requires the city engineer to make an estimate of the life of paving before contracts can be awarded.

Pennsylvania to Distribute Bonus Among Townships

The State of Pennsylvania is preparing to distribute a bonus among the townships of the state which collected their road taxes for 1912 in cash, and warrants are being drawn by the State Highway Department for the various amounts due the several townships.

Under the provisions of the laws of 1909, townships collecting road taxes in cash are entitled to a bonus of 50 per cent. The entire amount necessary to pay this bonus has never been appropriated by the State Legislature. While the same situation exists this year, a more liberal provision than before has been made, and the amount to be distributed will be double that in 1911 and in 1912.

According to figures compiled by the State Highway Department $5,089,976.32 was collected altogether for road purposes by the townships.

Some of the counties in which townships will receive a share of the bonus and the amounts to be received in each county are as follows: Adams, $12,108.18; Bedford, $14,548.21; Berks, $31,401.40; Blair, $9,317.38; Bucks, $23,412.68; Cambria, $13,913.55; Carbon, $5,037.91; Centre, $14,412.41; Chester, $31,619.59; Clearfield, $21,234.63; Clinton, $7,305.28; Columbia, $11,318.49; Cumberland, $15,761.37; Dauphin, $11,969.70; Delaware, $3,200.27; Franklin, $15,974.46; Fulton, $4,212.20; Huntingdon, $11,474.35; Juniata, $7,360.06; Lackawanna, $8,115.73; Lancaster, $37,081.39; Lebanon, $10,426.05; Lehigh, $14,884.51; Luzerne, $15,562.66; Lycoming, $16,629.98; Mifflin, $5,570.93; Monroe, $11,108.95; Montgomery, $18,728.26; Montour, $4,160.83; Northampton, $13,781.70; Northumberland, $12,087.49; Perry, $9,584.10; Pike, $6,057.69; Schuylkill, $14,876.75; Snyder, $7,906.16; Union, $6,683.72; York, $33,970.22.

Altogether, a total of 1,400 townships will receive a share of the bonus.

Contracts to be Awarded for State Aid Roads in Pennsylvania

The State Highway Department of Pennsylvania is advertising for bids for the construction of 124,624 lin. ft. of state aid highway. Bids for the work which comprises twelve contracts will be opened Sept. 17. This is the third important letting for state road work in Pennsylvania this year. The counties in which the roads are to be built, the number of lin. ft. in each, and the material to be used follow:

Montgomery, 19,506, macadam; York, 3,131, asphaltic concrete; Adams, 3,289, macadam; Northumberland, 6,674, brick block; Franklin and Cumberland, 16,368, telford macadam; Susquehanna, 13,327, macadam; Clearfield, 4,700, brick block; Lycoming, 8,344, brick block; Crawford, 17,400, macadam or brick block; Bradford, 20,876, macadam or brick block; Wayne, 7,309, brick block; Cambria, 3,700, macadam.

Six concrete bridges have been built recently across Snow Creek in the city of Anniston, Ala., and several other bridges are contemplated.

Plans are being made for the construction of an automobile road between Savannah and Rosedale, Mo. It is said that a large sum has already been subscribed to defray the expense.

Bids are being advertised by Commissioner of Public Works McGann of Chicago, Ill., for the construction of the proposed Lake St. Bridge. The plans for the structure call for a double deck trunnion bascule bridge, the upper level approach of which will be used by the Chicago & Oak Park Elevated Railroad. The total cost is estimated at about $550,000, of which the railroad company will pay one-third.

Plans for Street Improvement in Houston, Texas

Plans of the city administration of Houston, Tex., showing the disposition of the $800,000 in bonds for street improvement voted July 1 of this year, have been made public.

A portion of the proceeds of the bond issue will be used for repaving a number of streets in the downtown section of the city, for which contracts were awarded prior to Feb. 1. This work will be done before any new construction is started. The $800,000 will be apportioned among the wards in proportion to the percentage of the city tax paid by each as follows: First Ward, paying 8.1 per cent., $64,800; Second Ward, 11.1 per cent., $88,800; Third Ward, 37.1 per cent., $296,800; Fourth Ward, 30.5 per cent., $244,000; Fifth Ward, 9.9 per cent., $79,200; Sixth Ward, 3.3 per cent., $26,400.

It is estimated that after the city's share of the cost of paving for which contracts were awarded before Feb. 1 is paid, the following amounts will be available for new construction in the several wards: First, $60,000; Second, $52,000; Third, $140,000; Fourth, $86,000; Fifth, $79,000; Sixth, $26,000—a total of $443,000. None of the old contracts is in the Fifth or Sixth Wards.

MEETINGS

Colorado-To-The-Gulf Highway Association

A meeting of the Colorado-to-the-Gulf Highway Association, held at Clayton, N. M., Aug. 28, was attended by delegates from the three states through which the proposed Colorado-to-the-Gulf highway will run: Colorado, New Mexico and Texas. The route of the highway was divided into three sections, the first comprising that part in Colorado and New Mexico, known as the Rock Mountain division, the second extending from the New Mexico line to Dallas County, designated as the Panhandle division, and the third running down to Galveston, known as the Gulf division.

Davidson and Randolph Highway Association

The Davidson and Randolph Highway Association was organized Aug. 29 at a meeting held in Denton, S. C. The membership consists of citizens of Denton and neighboring towns who are interested in the construction of a highway extending from Asheboro, on the Capital Highway, to the National Highway at either Salisbury or Thomasville. The road, if built, will open up farming and timber sections of Randolph and Davidson Counties. Sand-clay construction is favored by the advocates of the highway. The officers of the association are as follows: President, Arthur Ross, of Asheboro; Vice President, J. T. Sexton, of Denton; Secretary and Treasurer, G. Dan Morgan.

An organization known as the Lane County Road Builders' Club was formed at Eugene, Ore., Aug. 28.

Citizens of Perkins County, Ala., held a mass meeting Aug. 28 at Carrollton and formulated plans for advancing the work of constructing a highway across the county through Gordo, Reform, Carrollton and Aliceville.

A good roads meeting and luncheon were held at the Traffic Club, Denver, Colo., Aug. 28. The meeting was made the occasion of discussing the route of the Lincoln Highway through Colorado. Henry B. Joy, President of the Lincoln Highway Association, and Carl G. Fisher and A. R. Pardington, Vice Presidents, were present. President Edward J. Yetter of the Denver Chamber of Commerce pledged the support of his organization in the construction of the road. Following the meeting it was announced that the route would include Denver. As planned at present, the highway will enter Colorado at Julesburg, passing through Sterling, Fort Morgan and Bennett to Denver, thence north through Fort Collins to Cheyenne, Wyo. Previous to the meeting it had been understood that the highway was to follow the route of the Overland Trail between Omaha, Neb., and Salt Lake City, Utah, without entering Colorado.

COMING MEETINGS

Sept. 17-18.—National Paving Brick Manufacturers' Association—10th Annual Meeting, Cleveland, Ohio. Secretary, Will P. Blair, 824-826 B. of L. E. Bldg., Cleveland, Ohio.

September 29-October 4.—American Road Congress.—Annual session, Detroit, Mich. Secretary J. E. Pennybacker, Colorado Building, Washington, D. C.

October 7-10.—American Society of Municipal Improvements.—20th Annual Meeting, Wilmington, Del. Secretary, A. Prescott Folwell, 15 Union Square, New York, N. Y.

October 22-23.—Southern Appalachian Good Roads Association.—Annual Convention, Asheville, N. C. Secretary, H. B. Varner, Lexington, S. C.

Nov. 10-11.—Georgia-Carolina Good Roads Congress—Augusta, Ga. Secy., J. C. Harper, 511 Dyer Bldg., Augusta, Ga.

November 10-15.—United States Good Roads Association.—Convention, St. Louis, Mo. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

December 9-12.—American Road Builders' Association.—10th Annual Convention, 4th American Good Roads Congress and 5th Annual Exhibition of Machinery and Materials, First Regiment Armory Bldg., Philadelphia, Pa. Secretary, E. L. Powers, 150 Nassau St., New York, N. Y.

February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

State Good Roads Convention in Pennsylvania

A call has been issued for a state good roads convention to be held Sept. 18 in the hall of the House of Representatives, State Capitol, Harrisburg, Pa. The meeting will be held in the interest of the referendum measure providing for a bond issue of $50,000,000 for highway improvement which will be submitted to the voters of the state at the November election.

According to the announcement sent out by the temporary organization conducting the preparations for the meeting, the attendance will consist of representatives of automobile clubs, local good roads associations, boards of trade, chambers of commerce, and county medical societies of the state, together with chairmen of the county committees of political parties, newspaper editors, judges, district attorneys, county commissioners, heads of leading labor organizations and of various religious denominations and prominent citizens of the state.

From this gathering a county committee including one from each class as enumerated above will be appointed for each county for the purpose of looking after details of the campaign in their various jurisdictions.

Plans are being formulated for a series of meetings throughout the state for which a "central office" will provide speakers. A schedule will be made up of the circuits of the various speakers and 1,000,000 handbooks, according to the announcement, will be furnished the county committees.

At the principal meeting in each county the local automobile club will be asked to provide a supper for the supervisors throughout the county, to insure their attendance.

The Chamber of Commerce of Marysville, Cal., is making preparations for a good roads convention to be held in that city late in September or early in October.

A meeting will be held at Ogden, Utah, in the near future, in the interest of the movement for a scenic highway to the top of Ben Lomond, a local mountain peak. The route of the proposed road is ten miles long, and it is estimated that the work of construction will cost about $30,000.

A meeting will be held Sept. 17 at Bluefield, W. Va., to discuss ways and means of building a through highway connecting Bluefield, Charleston, Huntington and other important centers in West Virginia. The meeting which was suggested by A. D. Williams, Chief Road Engineer of West Virginia, will be conducted under the auspices of the Bluefield Chamber of Commerce.

PERSONAL NOTES

John Pierce has been re-elected Superintendent of Streets of Athens, Tenn.

Joseph Firth, City Engineer of Charlotte, N. C., since 1907, has resigned.

S. C. Dreyfus, of Audalusia Co., Ala., has been appointed Superintendent of the system of roads to be built in District No. 2, Tyler, Tex.

H. B. Childs has been appointed District Engineer of the Minnesota State Highway Commission, in charge of highway work in the vicinity of Winona.

Lester F. Allen has been elected City Engineer and H. C. MacFarlane has been elected Superintendent of Public Works of Tennell, Tex.

A. D. C. Blanchard, City Engineer of Lethbridge, Alta., has resigned to accept a position in the office of the City Engineer at Vancouver, B. C. W. C. Harvey is Acting City Engineer of Lethbridge.

Homer A. Collar, formerly City Engineer of Grand Rapids, Mich., died at his home in Chula Vista, Cal., Aug. 4. Mr. Collar's tenure of office as City Engineer of Grand Rapids covered the thirteen years between 1883 and 1896.

Prof. Thomas B. Stillman of Stevens Institute, has been retained by the City Council of Hoboken, N. J., to make chemical analyses of asphalt and concrete to be used in paving Washington St. The analyses will be made as the work of paving progresses and by resolution of the city council must be made at least once on every city block.

August E. Christhelf, Highway Engineer of Fulton County, Ga., has tendered his resignation and will accept the presidency of the American Paving Co., of Baltimore, Md. The company is a new one, incorporated Aug. 27, with a capital stock of $75,000, to engage in street and road construction. Mr. Christhelf for several years was Chief Engineer of the Commission for Opening Streets of Baltimore.

GOOD ROADS

A Weekly Journal of Road and Street Engineering and Contracting

Old Series, Vol. XLIV.
New Series, Vol. VI.

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Route of the Lincoln Highway

According to an announcement by the directors and officers of the Lincoln Highway Association the road which manufacturers of automobiles and accessories are promoting will traverse thirteen states: New York, New Jersey, Pennsylvania, Ohio, Indiana, Illinois, Iowa, Nebraska, Wyoming, Colorado, Utah, Nevada and California.

Starting at New York City the route has been planned to pass throught Jersey City, Newark, Trenton and Camden, N. J.; Philadelphia, Lancaster, York, Chambersburg, Bedford, Ligonier, Greensburg, Pittsburgh and Beaver Falls, Pa.; Mansfield, Marion, Kenton, Lima and Van Wert, O.; Fort Wayne, Ligonier, Elkhart, South Bend, LaPorte and Valparaiso,. Ind.; Chicago Heights, Joliet, Geneva, DeKalb, Rochelle, Ashton, Dixon, Sterling, Morrison and Fulton, Ill.; Clinton, Dewitt, Cedar Rapids, Tama, Marshalltown, State Centre, Ames, Grand Junction, Jefferson, Dennison, Logan and Council Bluffs, Ia.; Omaha, Freemont, Columbus, Central City, Grand Island, Kearney, Lexington, Gothenberg, North Platte, Ogallalla, Big Spring, Chappell, Sidney and Kimball, Neb.; Julesburg, Sterling, Fort Morgan, Denver, Longmont, Loveland and Fort Collins, Colo.; Pine Bluff, Cheyenne, Laramie, Rawlins, Wamsutter, Point of Rocks, Rock Springs, Green River, Granger, Fort Bridger and Evanston, Wyo., Echo, Parley's Canyon, Salt Lake City, Garfield, Grantsville, Timpie, Kanaka Ranch, Fish Springs, Kearney's Ranch and Ibapah, Utah; Tippet's Ranch, Shelburne Pass, Ely, Eureka, Austin, Fallon, Wadsworth, Reno and Carson City, Nev.; and Truckee, Auburn, Tallac, Placerville, Sacramento, Stockton, Oakland and San Francisco, Cal.

It is stated that in selecting this route the directors of the association were governed by considerations of grade and the opening up of those sections of the country affording the most attractive scenery.

Branch highways are proposed to connect with Gettysburg, Pa.; Washington, D. C.; Canton, Ohio, the Mammoth Cave of Kentucky; Springfield, Ill.; the Grand Canyon of Colorado, and other points in that state and with places of interest in Utah, Nevada, and California.

Street Paving Plans for 1914 in Baltimore, Maryland

Chairman R. Keith Compton of the Paving Commission of Baltimore, Md., has forwarded a general letter to the heads of the municipal departments, announcing the streets which the commission expects to improve during 1914.

Mr. Compton has arranged the streets in four lists, A, B, C and D, according to the dates at which the work can be done. List A comprising those streets which are available for improvement at once includes sections of Park, Edmondson, Patterson Park and Eastern Aves., and Lanvale, Mulberry, Lexington, Fayette, Paca, Hamburg, Charles, Towson, Lancaster, Eden, Lombard, Orleans, Caroline and Bond Sts., approximately six miles. List B, which comprises those streets which will be available for improvement about April 1, 1914, and which were carried over from the tentative list of 1913, includes sections of Park, Fremont and Harlem Aves. and Howard, Mosher, George, Madison, Washington, Fayette, Water and Lombard Sts., approximately five miles. List C, comprising newly designated streets, available April 1, 1914, includes sections of Fremont Ave. and Cross, Paca and Chester Sts., approximately one mile. List D, which comprises streets available July 1, 1914, includes sections of the following: Canton and Patterson Park Aves. and Presstman, Franklin, Gilmor, Calhoun, Paca, Warner, Eutaw, Ostend, Cross, Hamburg, Centre, Haubert, Chester and Lanvale Sts., approximately seven miles.

The purpose of Mr. Compton in forwarding a letter to the heads of the city departments is to give notice of the intended paving so that the several departments can provide for their own operations in advance of the paving.

Proposed Road Improvement in Milwaukee County, Wisconsin

The committee on highways and bridges of the Board of County Commissioners of Milwaukee County, Wis., has prepared a list of the county roads which it proposes to improve during the next year. The list, which comprises a total of 34 miles, includes the following: Whitefish Bay road, 3½ miles; Green Bay road, 7 miles; Port Washington road, 2½ miles; North Fond du Lac road, 3 miles; Lisbon and Burleigh road, 3 miles; Watertown road, 2½ miles; Hawley road, between the Blue Mound road and the Janesville Plank road, 2½ miles; Kilbourn road, 2 miles; New road, 2 miles; Howell road, 1 mile; Loomis road, 2½ miles; Chicago road, 2½ miles.

The committee proposes to recommend to the county board that certain roads of the county be turned over to the state as a part of the state highway system, to be improved by state aid. These roads are the following: New road, which is an extension of Eighth Ave., to the county line; the Whitefish Bay road; the Greenfield Ave. road, from the city limits of Wauwatosa to the Janesville road, and a number of small roads in the town of Cudahy.

It is planned that about $696,000 will be appropriated by the county and state for the improvement of the entire system of roads, including county and state aid. Of this amount the county will be asked to appropriate $465,000 and the state, under the new highway improvement law, will appropriate about $231,000.

Calhoun County, Alabama, to do its Own Road Work

The county commissioners of Calhoun County, Ala., of which the city of Anniston is the county seat, have decided that in future the county will do its own highway work instead of having it done by contract as at present. The plans of the commissioners contemplate an entire reorganization of the existing system of highway work. W. E. Parker, Street Overseer of Anniston, has been appointed to take charge of county road work. Mr. Parker, it is stated, proposes to reduce the number of road overseers to one for each beat, and to require overseers to build culverts and make minor repairs in their several beats, instead of having general supervision as at present. The county will be divided into four road districts. The county commissioners plan to expend $50,000 annually in improving the highways.

Pipe Subways in Prague, Austria

In response to a letter of inquiry concerning the use of the space under the sidewalks for telephone, telegraph and electric light wires, sewer and water pipes and other subsurface works, Consul J. I. Brittain of Prague, Austria, explains in an article in a recent issue of the "Daily Consular and Trade Reports" the methods followed in the city of Prague.

In order to prevent the tearing up of pavements, according to Consul Brittain, the Prague Department of Public Works holds a meeting each autumn, to which it invites all public service corporations interested in subsurface structures in the city streets. These include the telephone and telegraph department, electric light and electric railway interests, gas companies, the pavement department of the city, and representatives of the public water service. At the meeting all matters relative to contemplated improvements for the coming year are discussed and plans made for carrying on the work.

In Prague the space under the sidewalk is used for the telephone, telegraph and electric light wires, and in some streets also for gas pipes and for sewer connections with the abutting buildings. The telephone and telegraph wires are placed in separate conduits as are also the electric light wires. These conduits are provided with frequent manholes, through which ready access may be had for the examination of the wires. The water and gas mains are, as a rule, placed under the streets, which are paved with granite blocks laid in sand, there being no asphalt or concrete pavement in the city. The telephone and telegraph system is owned and operated by the government, while the electric light and electric car service are owned and operated by the municipality.

According to the report of Consul Brittain, a trial is to be made of the method used in London, Hamburg and other large cities, by which concrete pipe galleries about 5 ft. wide and a little over 6 ft. high, are built to accommodate all wires and tubes with the exception of gas pipes. According to the report, the cost of one yard of such tubes would be about $35, and it is stated that owing to this cost it is unlikely that the method will be followed.

Highway Improvement in Nassau County, New York

Bids for the sale of $500,000 of road improvement bonds of Nassau County, N. Y., were opened at Mineola, Sept. 8. From the proceeds of the sale of these bonds the existing roads of Nassau County will be improved, and in addition, several new highways will be constructed.

The money will be apportioned as follows: Town of Hempstead, $250,000; North Hempsted and Oyster Bay $125,000 each. Bids for the bonds were received from nineteen banking houses.

Proposed Road Improvement in Warren County, Mississippi

The County Board of Supervisors of Warren County, Miss., at its regular meeting during the first week in October will complete plans for a county road bond issue of $300,000.

The proceeds of this issue will be used for rebuilding about 90 miles of county roads, including the six principal thoroughfares. These comprise the Valley road to Yazoo County line; Baldwin Ferry road to Big Black River; Benson and Jackson road to Oak Ridge; Fisher's Ferry road to Big Black River; Hankinson's Ferry road via Yokena to Big Black River, and the Bovina road to Big Black River.

A bridge and road tax of 1¾ mills was decided upon at the September meeting of the board.

Control of County Roads in California

Attorney-General U. S. Webb of California has handed down a ruling to the effect that the state has exclusive jurisdiction over county roads which have been adopted as parts of the state highway system. This will affect about 2,000 miles of road.

The question of the control of county roads in the matter of franchises, etc., was brought up in Los Angeles County, wherein the Sunset Telephone Co. applied to the County Board of Supervisors for a franchise to run a pole line on the Ventura County road between Los Angeles and Calabasas. This is one of the routes which has been adopted by the State Highway Department, and the Board of Supervisors referred the application to that body.

The ruling also states that while county roads are being constructed by the State Highway Commission, the commission has absolute right to close them. This settles the question of whether or not the State Highway Commission has the right to punish individuals who remove barriers which have been placed by its orders during the construction period.

Twenty-five Bridges have been destroyed by floods in Hamilton Township, Ontario, within a short time.

Plans for a Bridge at Washington, D. C., to cross the Potomac River, linking the District of Columbia with the State of Virginia, are being considered by the Commerce Committee of the House of Representatives. The estimated cost of the structure is approximately $4,000,000.

Funds for the Construction of a Concrete Road along the north shore of Lake Minnetonka, in Hennepin County, Minn., will be temporarily provided by the North Shore Improvement Association. The proposed road, which will extent from Wayzata to the Chrystal Bay bridge, will cost approximately $46,000, according to estimates prepared by W. E. Stoopes, the engineer appointed to supervise its construction. The County Commissioners of Hennepin County advertised for bids for its construction a short time ago, but no bids were submitted, the contractors contending that the profit on concrete construction was so small that they could not afford to advance the necessary money for materials and labor. In order to expedite the work the money is being raised by subscription by the members of the North Side Improvement Association. It will be returned when the work is completed and the contractors paid.

Good Roads Days in Various Sections

In a number of localities in several states in the central and southwestern sections of the country certain days of the next two months have been designated as "good roads days." On these days the population is expected to turn out en masse and work on the roads in their respective vicinities, following the example recently inaugurated on a large scale in the state of Missouri.

County Judge Isaac McClellan of Grant County, Ark., has designated Oct. 1 and 2 as the days in which the citizens will work the roads, and on Oct. 15 and 16 the citizens of Eureka Springs, Ark., and vicinity will improve a road leading west from Eureka Springs to Rogers, connecting with several automobile roads.

In Searcy County, Ark., County Judge V. C. Bratton has designated Oct. 1 and 2 as days for improving the highways of the county. Considerable enthusiasm has been manifested in that county, and mass meetings have been held, and committees appointed to arrange for the work in various sections of the county. Marshall and Leslie, two of the principal towns of the county will engage in a contest as to which community will produce the most workers. Arrangements have been made to have a civil engineer survey the road between the two towns. It is hoped later to extend this road to Little Rock.

Oct. 15 and 16 have been set aside as "good roads days" in Graves County, Ky. This was decided upon at a meeting of the Fiscal Court and a number of citizens held early this month. A resolution has been adopted by the court naming the two days, and requesting all able-bodied male citizens, regardless of age or occupation, to work upon the public roads.

Acting on the suggestion of the Chamber of Commerce of Fort Worth, Tex., the Tarrant County Commissioners have designated Oct. 5 and 6 as "good roads days" for the county, and it is expected that about 10,000 men will volunteer to work on the roads of the county.

The Texas Motorway

Work of constructing the Texas Motorway, a stone highway which when completed will extend from Fort Worth to Del Rio, Tex., a distance of 500 miles, has been commenced and a section between 18 and 20 miles long running out from Glenrose, the county seat of Somervell County, has been completed.

The road is being constructed by the Texas Motorway Co. at an estimated total cost of approximately $2,500,000. It will be built on a 100-ft. right of way.

As soon as a sufficient section is completed a regular schedule for motor traffic will be inaugurated. Both passenger and freight traffic will be provided for, passengers being transported in large cars with a capacity of twenty-five to thirty persons, similar to the motor omnibuses in use in New York City, Philadelphia, London and other large cities and freight in heavy trucks.

Property owners along the route are expected to donate $2,000 per mile and the right of way. Thus far, it is stated, there has been no difficulty in securing these concessions.

According to present plans the motorway will cross Tarrant, Johnson, Somervell, Erath, Hamilton, Lampasas, San Saba, Mason, Kimble, Edwards and Valverde Counties. Much of the country to be traversed is practically without railroad facilities.

Highway Bonds amounting to $150,000 have been authorized by the voters of Bond District No. 2 of Brazoria County, Tex. The proceeds will be used to construct a road from Angleton to the Harris County line at Alameda. This issue makes a total of $650,000 voted this year in the county. Of this amount, $300,000 was voted in the Alvin District, $150,000 in the Suburban Gardens District, and $50,000 in the Liverpool District.

MEETINGS

Pikes Peak Highway Association

The Pikes Peak Highway Association was organized at Colorado Springs, Colo., Aug. 28, in the interest of a proposed road between Oakley, Kan., and Colorado Springs.

The organization was effected at a conference held in the Court House at Colorado Springs between the County Commissioners of Logan and Wallace Counties, Kan., and Cheyenne, Lincoln and El Paso Counties, Col. The Golden Belt Cut-Off Association, previously formed in the two Kansas counties, was merged with the new association.

The new road is considered desirable because of the saving in distance between Kansas points and Colorado Springs. It is estimated that the distance between Kansas City and Colorado Springs over existing routes would be reduced 47 miles by the proposed new road.

Three States Good Roads Rally

A meeting, designated as the Three States Good Roads Rally, and attended by delegates from the states of California, Oregon and Washington, was held at Eureka, Cal., Aug. 20 and 21, pursuant to a call issued by the Humboldt Promotion and Development Committee, under the auspices of the Chamber of Commerce of Humboldt County, California.

The purpose of the rally was to promote systematic and scientific highway improvement and to organize a permanent association. Gov. Hiram W. Johnson of California opened the meeting. After an addresss by Gov. Johnson on the subject of good roads, Gov. Lister of Washington was elected Chairman, T. W. Hines of Eureka, Vice Chairman, and Bert R. Greer of Ashland, Ore., Secretary. Following Gov. Lister's address on "The General Necessity for Good Roads," committees on permanent organization and resolutions were appointed.

The program for the first day included the following: Address, "Linking up the Pacific Coast States," Captain J. Rupert Foster, Marysville, Cal.; address, "County and Intercounty Roads," Dr. J. B. Bullitt, San Jose, Cal.; address, "Combined State and County Road Building," B. F. Lynip, Alturas, Cal.; address, "How to Raise Money for Road Building," M. B. Johnson, San Mateo, Cal.; address, "The Care and Upkeep of Roads," Col. C. M. Hammond, Upper Lake, Cal.; address, "The Need of a Highway from the Sacramento Valley to the Coast," C. H. Edwards, Weaverville, Cal. Col. Hammond's address contained some apparently adverse criticism of the methods employed by the State Highway Commission to which Burton A. Towne, Chairman of the California Highway Commission replied.

At the evening session, which was presided over by Mayor Clark of Eureka, Gov. Johnson delivered an address on good roads in general and the policy of the administration in the expenditure of the $18,000,000 bond issue under which the state of California is building highways. Gov. Lister of Washington followed with an address on scientific road construction. Rufus R. Wilson of the Humboldt Development Committee read a report on the Humboldt County highway system. B. H. Burrell, Senior Highway Engineer, U. S. Office of Public Roads, gave an address on "The Roads of Humboldt County." Robert Newton Lynch, Vice President, San Francisco Chamber of Commerce, spoke on "What Good Roads Mean to the Farmer," and John P. Irish of San Francisco on "General Road Building."

At the morning session, on Aug. 21, Bert R. Greer of

Ashland, Ore., addressed the meeting on "Financing National Aid to Good Roads," and H. S. Gans of Red Bluff, Cal., spoke on "The Automobile and Good Roads."

The report of the committee on permanent organization which was read at this session was to the effect that the organization should be known as the Pacific Coast Good Roads Association, organized for the purpose of promoting the construction and maintenance of public highways in the states of Washington, Oregon and California. According to the report, any public officer of the three states or duly accredited representative of any commercial organization or other organization interested in good roads shall be a member of the association, and any resident of any one of the three states is eligible to admission. The general rules governing an organization were contained in the report.

The following officers of the permanent organization were elected: President, Dudly V. Saeltzer, Redding, Cal.; Vice President for Washington, E. S. Collins, of Ostrander; Vice President for Oregon, J. M. McCoy, of Ashland; Vice President for California, Dr. J. B. Bullitt, San Jose; Treasurer, B. F. Lynip, Alturas, Cal.; Secretary, George E. Boos, Medford, Ore. An executive committee was also elected.

A resolution was adopted expressing the confidence of the delegates to the Three States Good Roads Rally in the California Highway Commission, and in the belief that "the work of the commission has been faithful, conscientious and efficient, and that the methods employed by them insure the best practical results."

A communication was read by George E. Boos in behalf of the City of Medford, on inviting the association to hold its 1914 convention in that city, and the invitation was accepted. The date for the convention is to be determined by the executive committee and announced later.

A clam bake was served in the Eureka city park at 2 P. M., Aug. 21, and was attended by about 4,000 people. A banquet was held at the Vance Hotel in the evening of the same day. Among the speakers at the banquet were Ex-Gov. J. N. Gillette of California, Gov. Lister of Washington, Gov. Johnson of California, and several others. About 200 of the guests at the banquet became permanent members of the Pacific Coast Good Roads Association.

Highway improvement was discussed on the morning of Sept. 5 at the Conference for the Advancement of Rural Life which was held at DeKalb, Ill. Among the speakers were A. N. Johnson, State Highway Engineer of Illinois; President Edens of the Illinois State Highway Association, Representative Tice, author of the Tice Good Roads law, and S. E. Bradt, member of the State Highway Commission.

The following officers were elected at the 27th Annual Convention of the County Commissioners of Pennsylvania, held August 13 and 14 at Williamsport, Pa.; President, H. R. Fleming, Lycoming County; First Vice President, A. M. Liveright, Clearfield County; Second Vice President, James Krewson, Montgomery County; Secretary, F. G. Attenberg, Crawford County; Treasurer, George W. Allen, Delaware County.

A meeting of the citizens of Chicago Park, Auburn, Nevada City, Colfax and smaller towns of Placer County, Cal., together with members of the county board of supervisors, was held at Auburn, Sept. 2 to discuss plans for promoting the construction of a lateral state highway passing through Auburn and Nevada City. Delegates from Nevada City advocated the route of the state road by way of Grass Valley, Gautiers Bridge and Cottage Hill, while the representatives of Chicago Park and Colfax favored a road via those two towns. The meeting was adjourned without definite action on the part of the county board of supervisors.

COMING MEETINGS

September 29-October 4.—American Road Congress.—Annual session, Detroit, Mich. Secretary J. E. Pennybacker, Colorado Building, Washington, D. C.

October 7-10.—American Society of Municipal Improvements.—20th Annual Meeting, Wilmington, Del. Secretary, A. Prescott Folwell, 15 Union Square, New York, N. Y.

October 22-23.—Southern Appalachian Good Roads Association.—Annual Convention, Asheville, N. C. Secretary, H. B. Varner, Lexington, S. C.

Nov. 10-11.—Georgia-Carolina Good Roads Congress—Augusta, Ga. Secy., J. C. Harper, 511 Dyer Bldg., Augusta, Ga.

November 10-15.—United States Good Roads Association.—Convention, St. Louis, Mo. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

December 9-12.—American Road Builders' Association.—10th Annual Convention, 4th American Good Roads Congress and 5th Annual Exhibition of Machinery and Materials, First Regiment Armory Bldg., Philadelphia, Pa. Secretary, E. L. Powers, 150 Nassau St., New York, N. Y.

February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

PERSONAL NOTES

Morgan T. Gum has been appointed County Road Engineer of Sussex County, Del.

M. B. Watson has been appointed assistant engineer to the Ontario Public Roads and Highways Commission.

J. L. Harrop has been appointed Chief Engineer of the Missouri Public Service Commission. Mr. Harrop will devote his attention largely to grade crossing elimination of which he has special charge.

J. C. Peters has resigned his office as City Engineer of Tiffin, O., having been appointed County Surveyor and Engineer of Seneca County, of which Tiffin is the county seat. J. J. Oberlander succeeds Mr. Peters as City Engineer of Tiffin.

Morrell Vrooman has resigned as City Engineer of Gloversville, N. Y., after twelve years' service and will devote his time to practice as consulting engineer with Vrooman & Perry, sanitary engineers of Gloversville and Amsterdam, N. Y. Harry J. Hanmer, Assistant City Engineer of Gloversville since 1907 succeeds Mr. Vrooman as City Engineer.

Samuel Lancaster, a Consulting Engineer of Seattle, Wash., has been appointed consulting engineer on road construction for Multnomah County, Ore. By the terms of his arrangement with the county authorities, Mr. Lancaster will devote one-third of his time for at least one year to the improvement of county roads. In addition to the general supervision of the road work of the county, he will give special attention to the construction of the Portland-Hood River Scenic Highway.

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Bond Issues in Texas During August

According to a statement by the Texas Commercial Secretaries and Business Men's Association, six highway bond elections were held in Texas during August. Of these, four involving bonds to the amount of $410,000, were carried. The largest single issue was for $155,000. It was voted in Aransas County and it is stated that only eight votes were cast against the measure. The proceeds of the issue in this case will be used to construct a causeway from Live Oak Peninsula to Lamar Peninsula.

In addition to the bond elections, six elections were held during the month to vote on special road taxes, and at five of these elections the voters favored this system of securing funds for highway improvement.

Approximately 85 miles of highways were built in Texas during the month in 42 different counties.

Proposed Road Across Desert in Utah

The citizens of Kane County, Utah, are endeavoring to secure financial assistance from the state in the construction of a 20-mile road across the desert between Mt. Carmel and Kanab. This strip of land, which is little more than a sandy waste, is overgrown with heavy sage brush and cedars. Experiments in road building have been made and it is believed that a foundation can be constructed by cutting brush and laying it in the road bed to mitigate the effect of the deep sand.

There are some gravel, shale and clay deposits along the route, and it is considered that a road can be built at a cost not to exceed a few thousand dollars.

The construction of this road would shorten the distance between Salt Lake City and Kanab and the Grand Canyon by about 10 miles.

Street Work in the City of Portland, Maine

A total of $196,915.73 was expended by the Street Department of Portland, Me., during the year 1912, according to the annual report of Bion Bradbury, Jr., Commissioner of Public Works and City Engineer, which is noted elsewhere in this issue.

The city of Portland has an area of 21.55 sq. miles, of which about 4.5 sq. miles consist of islands. The estimated population at the close of 1912 was 60,300 and the tax rate $21.20 per $1,000. There were at that time 149.88 miles of streets in the city, including islands. The kinds of pavement making up this total were as follows:

KINDS AND AMOUNT OF PAVEMENT IN PORTLAND, ME., ON DEC. 31, 1912.

Kind of Pavement.	Sq. Yds.	Miles.
Brick	4,084.00	0.23
Cobble	13,895.00	0.71
Hassam	18,659.71	1.25
Bituminous macadam	32,630.00	1.94
Bitulithic	42,198.00	2.15
Tarred concrete	39,749.29	2.27
Granite	275,505.00	14.32
Macadam	257,122.00	16.13
Gravel, dirt and unimproved	....	110.88

The work done in 1912 included the construction of 24,905.30 sq. yds. of tarred concrete pavement at a cost of $33,309.88; 2,427.44 sq. yds. of granite block pavement with cement grouted joints, at a cost of $6,441.25, and 1,675.5 sq. yds. of bituminous macadam pavement at a cost of $1,786.38. Among the other principal items of expenditure were $24,848.19 for repairing and resurfacing dirt streets, $37,616.78 for street cleaning and $9,273.93 for snow and ice removal and the sanding of sidewalks. Sidewalk, curb and gutter work included the construction of 7,631.75 lin. ft. of new sidewalks, 8,396.71 lin. ft. of new curb and 6,907.74 lin. ft. of new gutters, and the relaying of 8,069.4 lin. ft. of sidewalk, 8,735.26 lin. ft. of curb and 2,231.15 lin. ft. of gutters.

The largest paving job done during the year was the construction of a tarred concrete pavement on Washington Ave., between Gould and Galvir Sts., comprising the fifth section of the state highway through the city. Bids were opened for the work on July 2 and the contract awarded to the Hassam Paving Co. for $11,733.75. The work, which comprised the paving of 3,016.2 lin. ft. of roadway containing 7,646.16 sq. yds. was commenced on July 11 and completed on Oct. 5.

The street contains a double line of car tracks, with a roadway on each side about 12½ ft. wide. The old road was excavated to a depth of 5 ins. below the grade established for the finished pavement and then thoroughly compacted by a steam roller. On this subgrade a 5-in. course of 1:2½:5 cement concrete was placed. The concrete was mixed in a Foote 5-A mixer, discharged upon the road through an iron chute attached to the machine, spread with rakes, tamped and finished with wooden floats. One day after completion the concrete was covered with sand and left undisturbed for seven days. After the concrete had dried and set, the surface was cleaned and a coating of "Hassamite" applied under pressure. Coarse sand was then spread over the pavement and rolled with a 10-ton tandem roller. The finished thickness of the bituminous surface was about ⅝ in., an average of .63 gal. of bitumen per sq. yd. having been used. The cost of the pavement was $1.36 per sq. yd., including engineering, inspection and underdraining.

Other tarred concrete pavements were put down on portions of India, Federal and Veranda Sts. and Forest and Brighton Aves. Bituminous macadam was used on Clark St., between Spring and Danforth Sts., and on Congress Square. Granite blocks with cement grouted joints were laid on portions of Commercial and West Commercial Sts.

During the year 39,066.5 sq. yds. of streets were treated with asphaltic oil at a total cost of $1,455.10. Of the area treated, 13,966.5 sq. yds. consisted of macadam which had been previously treated; 4,388 sq. yds. macadam which had not been previously treated; 14,210 earth, not previously treated; 4,202 gravel, previously treated, and 2,300 bituminous concrete, not previously treated. Asphaltoilene was used for most of the work.

The expenditure for bridge work during the year amounted to $4,538.78. A large part of this, according to the report, was occasioned by the necessity for repairing faulty construction on the drawspan of one of the city bridges.

As showing the kinds of pavement laid in the city, one of the tables printed in the report is of interest. This table shows the number of square yards of each of six kinds of pavement put down in the city during each of the past 15 years. The table is printed herewith.

KIND AND AMOUNTS OF DIFFERENT PAVEMENTS LAID IN PORTLAND, ME., DURING EACH OF THE PAST 15 YEARS.

Year.	Granite Block. Sq. Yds.	Paving Brick, Sq Yds.	Tarred Concrete, Sq. Yds.	Macadam, Sq. Yds.	Bitulithic, Sq. Yds.	Hassam, Sq. Yds.
1898...	5,019.49	529.91	....	14,164.00	....	......
1899...	1,995.43	....	....	533.66	....	......
1900...	10,247.12	183.42	....	5,010.25	....	......
1901...	13,928.06	1,766.21	....	6,180.35	....	......
1902...	11,995.89	....	....	2,560.00	1,651.36	......
1903...	7,620.42	....	....	4,819.01	1,997.15	......
1904...	15,752.49	....	....	5,558.23	7,500.27	......
1905...	8,478.15	....	....	9,063.00	9,865.87	......
1906...	10,151.74	715.00	....	8,247.15	7,350.30	......
1907...	8,444.98	249.56	....	22,275.14	12,507.31	5,001.13
1908...	5,868.83	....	....	31,080.90	1,326.54	4,894.51
1909...	3,241.20	640.26	....	29,940.25	....	5,330.51
1910...	4,830.40	....	....	23,408.20	....	2,104.80
1911...	1,294.28	....	14,848.99	....	....	1,329.71
1912...	2,427.44	....	24,906.30	2,261.80	....	......

Surveys for a New State Highway in California

The California Highway Commission has completed surveys and has passed upon most of the details for the location of a state highway connecting the San Fernando Valley with the Foothill Boulevard of the Los Angeles County highway system.

The new road, which will be a part of the main trunk line connecting San Bernardino with the north and south coast route will extend from the San Fernando Road at its junction with Lincoln Ave. through the Tejunga Terrace, and the Vale of Monte Vista, past the Little Landers colony, thence through La Crescenta and Montrose to the Foothill Boulevard at La Canada. The proposed highway will traverse a locality famous for its mountain scenery.

Necessary land for the right of way is being acquired, and plans are being made for the construction of a bridge across Arroyo Seco, which is on the proposed route.

The Joint Committee of the California Senate and Assembly recently made an automobile trip to Lake Tahoe over the Tahoe wagon road. The committee was appointed to investigate and report on state roads other than those built under the $18,000,000 bond issue, for the purpose of determining which shall be retained and improved as a part of the state highway system.

The Retiring Board of County Commissioners of Stark County, O., which went out of office September 15, called attention to the fact that 55 miles of paved roads had either been completed or contracted for in the county during the four-year term of office of the board. In addition to the roads 232 bridges and culverts have been built during the term of the board.

Preparing Plans for Boulevard System in Salt Lake City, Utah

City Superintendent of Parks Nicholas Byhower, of Salt Lake City, Utah, is preparing plans for a comprehensive boulevard system for the city, including a scenic road around the old Shore Line at the base of Ensign Peak. A preliminary survey for the Shore Line road was made by the city engineer's office at the instigation of Commissioner of Public Works W. H. Korns several weeks ago.

It is proposed to build a road leading from the state capitol ground to the Shore Line, and another extending to the Shore Line from a junction with the 11th Avenue Boulevard leading out of City Creek Canyon, making a loop, with the 11th Avenue Boulevard leading to the east and the Shore Line Boulevard to the west.

Several property owners of Davis County have announced their willingness to contribute land for the right of way, should the city conclude to construct the boulevards.

Proposed Street Improvements in Soalno City, California

Engineers who have been engaged in preparing specifications and estimates for street, sidewalk and sewer improvements in Solano City, a new subdivision of San Francisco, Cal., completed their work on Sept. 8.

The total estimated cost is $465,000, of which all but $62,000 is for laying out and improving streets and sidewalks.

The first street work to be done includes about 25 blocks in that portion of the subdivision which will be the business section.

For what is known as Class A improvement there will be required 178,758 cu. yds. of excavation, 143,385 sq. yds., of 5-in. oiled macadam, 337,380 sq. ft. of 5-ft. concrete sidewalks, and 62,779 lin. ft. of gutters. Of those improvements designated as Class B, 420,980 sq. ft. of 4-ft. sidewalks and 178,243 sq. yds. of oiled macadam streets will be required.

Proposed Highways Bond Issue in Cook County, Illinois

The county commissioners of Cook County, Ill., of which the city of Chicago comprises a large part, are considering a bond issue of $2,000,000 for the construction of roads in the county, and it is expected that the board will recommend such an issue to the voters for their approval at the next county election.

This proposed county road improvement is in addition to the improvement of those roads which will be constructed with state aid during the next two years. Under the provisions of the recently enacted law providing for state aid, the county will receive from the state the sum of $120,000, to which the county is required to add an equal amount, making a total of $240,000, to be expended on state aid roads, besides any independent improvements which may be conducted by the county itself.

The highway system of Cook County comprises about 1,400 miles of roads. The county is entitled to aid from the state to improve 25 per cent. or 350 miles. This will be maintained after the improvement by the state without cost to the county, and it is believed that the citizens of the county can well afford to provide funds for a large additional amount of improvement.

Petitions Have Been Drawn Up and are in circulation asking the County Court of Columbia County, Ore., to take action authorizing the survey of the Columbia River Highway through that county, a highway down the Nehalem Valley, and two roads connecting these main thoroughfares. There are 17 road districts in Columbia County.

The City of Missoula, Mont., is constructing a highway along the north bank of the Missoula River, connecting that district commonly known as the "Island," with the Van Buren Street bridge. The territory in which the highway is being constructed is practically all filled land, constructed of garbage, ashes and waste from the city. It is estimated that about five years will be required to complete the driveway.

New Street Improvement District in Boise, Idaho

The City Council of Boise, Idaho, has reported favorably on the establishment of a new sidewalk and curb district in the city.

The new district will include the following: Both sides of 5th St., west side of 6th St., east side of 23d St., west side of 24th St., west side of 25th St., east side of 28th St., north side of Sherman St., north side of Heron St., south side of Bannock St., north side of Washington St., both sides of Idaho St., and the south side of Alturas St.

Street Improvement in Galveston, Texas

Street work under way in Galveston, Tex., includes the improvement of Broadway between 11th and 29th Sts. by laying concrete paving and installing an ornamental lighting system.

This work, which has already been started, is being done under a plan by which the property owners on both sides of the street pay one-third of the cost, each individual being assessed that proportion of the expense of paving in front of his property.

The work has been delayed somewhat on account of the inclination on the part of some of the property owners to refuse to agree to this arrangement. It is said, however, that those who have taken exception are not householders, and, according to the law, the city can levy the part of the cost of the pavement to be paid by them against their property and hold it as a lien on the property, thereby forcing the owners to pay their part. With this plan in view the city has awarded the contract for the work.

REPORTS

CITY OF MELROSE, MASS., PUBLIC WORKS DEPARTMENT, THIRTEENTH ANNUAL REPORT. For the fiscal yeyar ending December 30, 1912. Paper; 6x9 ins., 48 pp.

This report, submitted by Geo. W. Wood, Engineer and Superintendent of Public Works, to Mayor Chas. E. French, covers the operations of the Public Works Department, in which are included the water, highway and sewer divisions. It consists principally of tabular matter showing the work done and its cost during the past year. The portion devoted to the highway division deals with the work on the streets and sidewalks of the city, including the operation of the city crusher, the work of street sprinkling and the collection of ashes and rubbish.

CITY OF PORTLAND, ME., ANNUAL REPORT OF THE COMMISSIONER OF PUBLIC WORKS; for the year ending December 31, 1912. Paper; 6x9 ins., 59 pp.; illustrated.

The annual report of Bion Bradbury, Jr., Commissioner of Public Works of Portland, Maine, consists largely of tabular matter showing the details of the work of the Department of Public Works for the year 1912. The report covers street construction, maintenance, cleaning and sprinkling, the application of dust layers, and sewer work. The first matter in the report is a table showing the statistics of the public works of the city. Included in the tabular matter are tables of cost and maintenance data on something over two miles of state highway situated within the city limits, a table showing the details of dust laying work during the year, another showing the cost of pavements laid during the year, another showing details of sidewalk and gutter work and others showing the amounts and kinds of pavements, gutters, sidewalks, curbs and crosswalks laid and relaid during the fifteen years ending Dec. 31, 1912. The illustrations in the report consist of full-page halftones showing bituminous macadam pavement at Congress Square, the state highway on Washington Ave. before improvement and after paving with tarred concrete, the tarred concrete pavement on India St. and a change of grade on Veranda St.

MEETINGS

Mississippi State Highway Association

At a meeting held at Meridian, Miss., August 26, and attended by several hundred delegates and visitors from various sections of eastern Mississippi, the Mississippi State Highway Association was organized. The meeting was opened by President Willman of the Meridian Board of Trade. C. C. Dunn, Chairman of the Good Roads Commission of Lauderdale County, was made Chairman and M. L. Bixler was made Secretary.

Preliminary remarks were made by Mr. Willman and by R. M. Levy of West Point, Miss. The first speaker on the regular program was Edgar S. Wilson, representing the Board of Trade of Jackson, Miss. He was followed by Clopton Thomas, Secretary of the Corinth Business Men's League; R. W. Robins, Mayor of Tupelo; W. D. Cook, Cashier of the Merchants and Farmers' Bank of Forest; Cliff Williams, representing the Lauderdale County Board of Supervisors; R. J. West of Okolona, and Guy Rencher of De Kalb. After Mr. Rencher's address a committee on resolutions, composed of one citizen from each county represented at the convention, was appointed. Following the selection of this committee a recess was taken and the delegates made an automobile trip over the Poplar Springs road, and lunched at its terminus.

The convention reassembled at 8 p. m. The first business of the evening was the adoption of a resolution creating a permanent good roads association and authorizing the appointment of an executive committee of one member from each county represented in the convention. The power to devise ways and means for carrying out the plans of the delegates was vested in this committee.

The resolution provided for the division by the executive committee of the section of the state in which the counties represented lie, into three districts, the first north of Lauderdale County; the second south of it, and the third west of Lauderdale and extending to the Mississippi River.

At the evening session addresses were made by Jesse Jones of Newton, L. E. Boykin of the U. S. Office of Public Roads, and W. S. Keller, State Highway Engineer of Alabama.

The executive committee reported the division of the state into districts as follows: North District, comprising the counties of Alcorn, Prentiss, Lee, Chickasaw, Monroe, Clay, Lowndes, Oktibbeha, Noxubee, Kemper and Lauderdale; South District, comprising the counties of Lauderdale, Clarke, Wayne, Perry, Harrison, Forrest, Jasper and Jones; Western District, comprising the counties of Lauderdale, Newton, Scott, Smith, Leake, Neshoba, Rankin, Hinds and Warren.

The report of the executive committee provided for the appointment a sub-committee of five for each county, consisting of three supervisors and two others. A board of officers consisting of a president and secretary from each district was elected. Clopton Thomas of Corinth was elected Chairman of the Executive Committee and Floyd Loper of Lake was elected Secretary.

At the conclusion of the Good Roads Institute held at Joliet, Ill., Sept. 12, arrangements were made for a permanent organization. J. H. Garnsey was made President and W. A. Baldwin, Secretary. Further organization details are to be worked out later. It is the desire of the officials to hold a winter session in Feb., 1914.

At a good roads meeting held on Sept. 16 in Guthrie Center, Ia., plans were made for the improvement of the section of the River to River road crossing Guthrie County. It was planned to mark the poles along the route of the road through the county with a white band, and a committee was appointed to have charge of the work. The necessary funds have been pledged. County road officials were present at the meeting and signified their intention of grading and dragging the road in order to put it in good condition for the fall and winter.

The Pennsylvania Good Roads Association was organized at a meeting held at Harrisburg on Aug. 29. It was planned to conduct a campaign of education particularly with a view of promoting bond issues for highway improvement. Former United States Senator John S. Fisher of Indiana was elected President; State Senator William C. Sproul, author of the so-called Sproul Road Act, was elected First Vice President; Frank Bell of Harrisburg was elected Secretary, and Charles S. Boll was elected Treasurer. A board of directors was also chosen. Other vice presidents will be elected later.

A meeting attended by the Portland, Ore., delegation of the Columbia River Highway Association and members of the Columbia county court was held at St. Helens, Ore., Sept. 5. Judge Harris of the county court presided, and addresses were made by Paul Wessinger, E. L. Thompson, James Muckle, Rufus C. Holman, Julius L. Meier and O. C. Leiter of Portland, Robert Yount of Rainier, and R. S. McBride of St. Helens. The speakers discussed the advisability of a bond issue to cover the expense of constructing the county's share of the Columbia River Highway, and it is expected that a petition for a vote on the project will result.

COMING MEETINGS

September 29-October 4.—American Road Congress.—Annual session, Detroit, Mich. Secretary J. E. Pennybacker, Colorado Building, Washington, D. C.

October 7-10.—American Society of Municipal Improvements.—20th Annual Meeting, Wilmington, Del. Secretary, A. Prescott Folwell, 15 Union Square, New York, N. Y.

October 22-23.—Southern Appalachian Good Roads Association.—Annual Convention, Asheville, N. C. Secretary, H. B. Varner, Lexington, S. C.

Nov. 10-11.—Georgia-Carolina Good Roads Congress—Augusta, Ga. Secy., J. C. Harper, 511 Dyer Bldg., Augusta, Ga.

November 10-15.—United States Good Roads Association.—Convention, St. Louis, Mo. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

December 9-12.—American Road Builders' Association.—10th Annual Convention, 4th American Good Roads Congress and 5th Annual Exhibition of Machinery and Materials, First Regiment Armory Bldg., Philadelphia, Pa. Secretary, E. L. Powers, 150 Nassau St., New York, N. Y.

February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

A meeting in the interest of good roads throughout the northwestern states will be held at Winona, Minn., October 6 and 7.

NEWS OF THE TRADE

The Universal Portland Cement Co. is constructing a new plant at New Duluth, Minn. The new plant will have an annual capacity of 1,400,000 barrels of cement, making the total output of the company 13,400,000 barrels. The foundations of the building are complete, and work on the walls has been started.

The North Western Expanded Metal Co. of Chicago, Ill., is distributing a new booklet entitled "Concrete Culverts." The text describes the use of "Econo" expanded metal as used for reinforcing concrete culverts. A table of the stock sizes of 3-in. mesh "Econo" for this purpose is included, together with several illustrations showing examples of the use of that material in concrete culverts and as a reinforcement for bridge flooring. The booklet comprises 24 pages and cover and measures 8½ ins. by ¾ in.

The Voters of Itasca County, Minn., have authorized a bond issue of $300,000 for the purpose of constructing county roads.

The President of Cuba is negotiating for a loan of several million dollars to be used in the improvement of the streets of Havana.

A Municipal Paving Plant in Columbia, S. C., has been suggested to the City Council of that city by Mayor Gibbes. The establishment of a Department of Public Works is also under consideration.

A $3,500,000 Bond Issue will be voted on by the people of St. Louis, Mo., at the next election, the proceeds to be used in building a new municipal bridge. In addition a large bond issue for street improvements is contemplated.

Applications for State Aid for the improvement of highways have been received from nine counties of Alabama and approved by the State Highway Commission. The total amount to be drawn by the counties is $20,000.

A 22-ft. Concrete Sidewalk will be built along the strand at Hermosa Beach, Cal., a distance of 1¾ miles. Initial steps for this work, which, it is estimated, will cost $35,000, have been taken by the City Trustees.

Bids for Street Bonds in St. Paul, Minn., were recently received. The bonds were in two issues aggregating $797,834 in amount. Of this sum, $523,484 is for widening and improving Robert St. and $274,350 for paving Summit Ave., between Lexington Ave. and the River Boulevard.

The U. S. Forest Service has announced that approximately $30,000, or 35 per cent. of the national government's receipts from grazing fees on the national forests in Montana during the past year will be returned to the state for roads and schools.

The Pittsburgh Chamber of Commerce has adopted a resolution indorsing the proposed amendment to the Pennsylvania state constitution authorizing a bond issue of $50,000,000 for the improvement of highways, which will be submitted to the voters at the November election.

An improvement proposed by the Blackpool Corporation, England, a town about thirty miles from Liverpool, consists of the extension of the Promenade to the southerly boundary of the borough, a distance of about a mile. The work will include the construction of a new sea wall, promenade, grass plots, carriage drive and a footpath, and a new road 50 ft. wide running parallel with the promenade. The estimated cost is about $320,000.

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FINANCING THE BUILDING OF ROADS

The part of road improvement with which the general public is most directly concerned and which is also one of the most vital parts of the work is the financing. Whatever methods are followed in selecting the roads to be improved, in preparing the plans or executing the work, the funds for defraying the cost of the improvement come in one way or another from the public purse.

In spite of the great importance of the whole question of providing the money for road betterment and the fact that it is of the greatest moment to the taxpayers there is perhaps no phase of road work in which lax methods are so prevalent. Indifference on the part of those who foot the bills can hardly be the cause of this condition, for the subject of taxes seldom fails to arouse the interest of those upon whom they are levied. Moreover, the raising of money for road improvement is commonly discussed and is made the basis of argument quite as often as is the provision of funds for any undertaking affecting the welfare of a community. Campaigns for bond issues in towns, districts, counties and states are of almost everyday occurrence, and one method of financing road building—that of using the federal treasury—is engrossing the attention of a constantly increasing portion of the people.

Having in mind these points the natural inference is that either the public lacks knowledge of sound methods of financing or is deliberately choosing methods not justifiable from economic or ethical standpoints. In some cases, notably those in which the burden of paying the bills is passed on to posterity by means of excessively long term bonds, the latter explanation is apparently to be accepted. But in the majority of instances of unsound financial arrangements, misunderstanding of the principles involved is the underlying cause.

Of late the problem of raising the money to carry out road improvement plans has received more attention than formerly, and engineers and public officials have studied it carefully and thoroughly. It has been one of the principal questions considered at various meetings and conventions, including the Cincinnati convention of the American Road Builders' Association last December and the Third International Road Congress at London this summer, and has formed the subject of many valuable papers presented at these and other similar gatherings of engineers and public men. This is an encouraging sign, for highway officials and engineers have been largely responsible for the attitude of the public towards this question. There has been a tendency for officials and engineers—especially the latter—to confine themselves too closely to the actual work of construction and maintenance and, in general, to the economical expenditure of available funds, without giving enough heed to the manner in which those funds were secured.

In this issue there are several articles dealing with the problem of financing road work. One of these, "Finance of the Construction and Maintenance of Roads," treats of the problem as it was dealt with in a series of papers presented at the London road congress by representatives of several different countries. This report is of especial value as a comparison of methods in countries where very different conditions are met. Another article which though not dealing exclusively with financial matters contains much of value concerning them is the review of the latest report of Nelson P. Lewis, Chief Engineer of the Board of Estimate and Apportionment of New York City, which is printed under the caption "Street Work in New York City During 1912." Mr. Lewis, through long and careful study and daily contact with the practical problems of financing street work in a great city, is qualified to speak with authority possessed by few engineers. A third article, "Financial Problems in Highway Engineering," is an abstract of a paper presented before the Society for the Promotion of Engineering Education by Professor Chatburn of the University of Nebraska. The author presents the subject in an entirely different way from that usually followed, putting before the reader not theories or practical results, but a series of suggestions as to the study of the economic questions of highway work and a statement of some of the considerations involved in financing such work.

Responsibility for the financing of road work as well as for its prosecution is coming more and more upon the engineer as he is more frequently being called upon to aid in executive and advisory capacities in the administration of public affairs. It is right that he should assume these duties where engineering works are involved and he owes it to his profession to discharge them with efficiency and honesty. In few ways can the highway engineer render more real public service than by taking a more active part than he has heretofore taken in placing before the public the particular phase of highway work in which the public is most vitally interested—the methods of financing the building of roads.

NATIONAL AID FOR BUILDING ROADS

Within the past two years the scheme of national aid in the building of roads has grown greatly in favor. The plan has been extensively advocated; numerous bills to tap the federal treasury for road building funds have been introduced in Congress; committees of that body have been appointed to take national aid under advisement, and a measure has been passed appropriating a nominal sum for the improvement of certain roads. Although the amount of the appropriation is so small that so far as results go it may be considered practically a negligible quantity, it is doubtless looked upon by the advocates of federal aid as an entering wedge for further inroads upon the nation's funds.

Before the era of railroads, transportation, except where waterways were available, was necessarily over wagon roads, and comparatively long hauls were common. As soon as the railroads became practicable utilities they began to replace animal-drawn vehicles as common carriers for long distance transportation; and as improvements were made in rolling stock and trackage, with the consequent reduction of rates, the railroads gradually took to themselves all of the carrying trade except the relatively short hauls. As these conditions developed, highways became less important factors in collecting and distributing the goods of the nation. Little was done to provide highway systems and even less to maintain existing roads, with the result that road work soon became almost entirely a local matter. The inhabitants of towns or counties were interested in the building of highways leading to railroad shipping points and providing channels of communication between different parts of their own communities. They had little interest in the roads of adjoining regions and almost none in those of sections further away.

In due time the reaction set in. As people began to travel more—through the influence of improved facilities or entirely new ones, such as the bicycle—a demand arose for more extensive highway systems, and the state aid principle was put into operation. For many reasons that are well known, the plan found favor and was rapidly extended. Now it is very generally indorsed by those conversant with the problems pertaining to the administration of road affairs.

Added impetus was given the good roads movement by the advent of the automobile and as improvements in this vehicle increased its radius of operation, sentiment in favor of interstate systems of roads began to be awakened. This naturally brought to the front the idea of federal participation in road building, with automobilists and automobile interests as its chief advocates. At present a considerable portion of the agitation for national aid comes from those quarters, although the idea has been taken up and exploited by others. In sections poorly equipped with roads and lacking the funds or the inclination to carry out extensive improvements, the plan of drawing upon the national treasury has naturally found ready support, and added strength has been given to the propaganda by those seeking political or other personal advancement.

Considering towns, counties and states as the geographical units composing the nation, it is, perhaps, natural to urge federal aid as the logical extension of the state aid principle. For the same reasons that the counties were justified in taking part in the building of roads in the towns within their borders and the states in participating in road building in their counties, it may be argued that the national government should take part in the construction of roads within the states, especially the construction of roads of an interstate character. The advocates of federal aid argue that through traffic—that is, interstate traffic—should be accommodated by interstate or national roads and that these should be financed, built and maintained either wholly or in part by the central government. They contend that this method has been successfully employed in other countries, and that road building is as much a federal function as is the improvement of waterways, irrigation, or the many works of internal improvement which the government participates in or carries on alone. That road building is more or less a function of the central government in some foreign countries is, of course, true. But in most of those countries the government is of a much more paternal character than would be tolerated in this country, and other conditions are very dissimilar.

The question is a large and many-sided one, and much can be said on both sides. Though it may be true that everything that can be said against it can be used equally well as an argument against the other activities of the national government, the whole matter depends largely upon one question; that is, whether national or interstate roads are needed. If national roads are economic necessities or are luxuries which the country can afford, there is, perhaps, excuse for federal aid if it is not accompanied by wholesale pork barrel legislation and other familiar evils. But it is very probable that the apportionment of a part of the national funds to the work of building roads would lead to very grave abuses. As expressed by James J. Hill, the letting down of the bars would result not in a pork barrel, but a slaughter house.

At present, practically the only travel of any considerable volume which is of an interstate character is that of automobiles driven for pleasure, excepting, of course, the ordinary traffic near state boundaries. Although motor trucks are being used in larger and larger numbers for hauling merchandise over the roads, they have not as yet replaced to any extent the railroad as a carrier for long distances. Those who are in touch with transportation problems agree that it is inevitable that this motor truck traffic will increase, and there is little doubt but that in a short time motor-driven vehicles will be used for carrying goods over much longer distances than at present. Some of this traffic will be of an interstate character, especially in the neighborhood of cities like New York, which are situated near the borders of several states. But until the time when merchandise can be carried better and more cheaply by the automobile than by the railroad, the larger part of commercial motor traffic will be, as at present, essentially local in character.

The travel on national or interstate roads is then narrowed down to the present automobile touring traffic and the prospective traffic made up of commercial motor vehicles covering distances greater than at present but yet comparatively short. In most cases this commercial traffic could, and undoubtedly would, be provided for by state cooperation equally as well as, if not better than, by the federal government. Since the same can be said of tourist travel, the state aid plan would seem adequate for taking care of present traffic and all that can reasonably be expected for some years to come.

The plea for national aid to the states in the building of their own intrastate highways, so far as it represents the sentiment of communities, generally arises from the desire of those communities to get something for nothing, in other words, to shift to the federal treasury the burden which should be borne by their own resources. The sovereignty of the state has been a principle from which citizens of this country, especially in certain sections, have been loath to depart in the past. Yet it is a curious fact that most of the agitation for federal aid first came from those parts of the country in which this feeling has been the strongest and from which the most violent opposition to any form of paternalism in the national government has always come.

The first principle of financing public improvements is that the expense should be distributed in direct proportion to the benefits conferred, and any scheme which contemplates a different distribution of the expense should be opposed. As has been pointed out in these columns, the equitable distribution of cost is one of the most serious problems that will be met with if national aid becomes a reality, and any plans which are proposed for federal aid should be most carefully scrutinized with respect to that particular point. In view of this and the other phases of the question to which attention has been directed, those having authority and influence should exert themselves to resist further diversions of the national funds to the building of roads until the whole problem has been investigated by a competent body and a rational and consistent plan of action formulated. It may be that federal aid in highway work will come, but it need not come as a half-formed and ill-advised policy.

THE A. R. B. A. CONVENTION

A meeting which gives promise of being remembered as the most important gathering of road builders during 1913 will be held in Philadelphia early next December when the American Road Builders' Association assembles in its tenth annual convention.

The nine previous annual conventions of this organization have been uniformly successful and its officials are confident of even greater success at the Philadelphia meeting. In view of what the association has accomplished in the past there is every reason to believe this prediction to be conservative—for the success of the American Road Builders' Association is the result of the sound principles followed in conducting its affairs.

The chief factor in bringing the organization to the enviable position which it now holds is that it is exactly what its name implies—an association of road builders. Its membership consists of men interested in various ways in the work of road construction and maintenance and it includes a large portion of the principal road and street officials, engineers and contractors in the country. These men have more than a casual or merely academic interest in the many and varied phases of highway work. They are vitally interested; for the building of roads, the paving of streets, the erection of highway bridge structures and the planning, administering and prosecuting of highway improvement, form their everyday work. Most of them do little, if anything, else and with them highway work is a vocation not an avocation.

In this respect the American Road Builders' Association differs from the other road organizations in this country. Its members do not discuss road building from the viewpoint of the politician seeking political preferment nor from that of the seller of motor vehicles or of materials, nor do they consider first the profits to be derived by a few from automobile tourists. They do discuss the pressing problems of organization, construction and maintenance which road builders are everywhere facing, and they discuss them with the authority conferred by training and experience.

The task before the road builders of America is not to gridiron the country with roads of any particular construction without regard to the need for such roads or the expense of building them. It is not to provide speedways to promote the sale of automobiles. It is not to secure the enactment of laws making road work a function of the federal government. It is, on the other hand, to provide the roads necessary for primary transportation; to devise ways and means for securing the economical expenditure of funds; to organize efficient executive and working forces, and, most of all, to ascertain the best methods of construction and maintenance.

Because these questions with which they are vitally concerned are discussed—and discussed seriously and intelligently—at the conventions of the American Road Builders' Association, the actual road builders should, and do, look upon the annual convention of that organization as the most important meeting of the year. Few active highway engineers or contractors have either the time or the inclination to listen to the addresses and discussions forming so large a part of the usual popular "good roads meeting" or "congress." They attend conventions because they want to learn all that they can about their work and want to meet and talk with authorities in their own line.

A year ago we took occasion to emphasize some of these things in pointing out the differences in the two organizations which at that time were soon to hold conventions—the American Road Builders' Association and the American Highway Association, then known as the American Assosiation for Highway Improvement. We called attention then to the fact that the so-called good roads movement had two sides—the popular and the technical—and that efforts to consider them both in the sessions of a single convention were never attended by satisfactory results. The attempt to do this was made by the American Highway Association at its convention in Atlantic City from Sept. 30 to Oct. 5 last year and it furnished adequate proof of the contention we had made a few weeks earlier. On the other hand, the convention of the American Road Builders' Association about two months later, which was conducted along the lines previously outlined here, was not only the most successful meeting that organization had ever held but the most successful that had ever been held in this country. Although at this writing the Detroit meeting of the American Highway Association has not convened, it is evident from what has been made public in regard to the program that, not profiting by last year's experience, the officials of that organization have planned a meeting very similar to the Atlantic City meeting—one in which the discussion of the technical and practical problems of road building is given a relatively unimportant place.

The Michigan Highway System

Michigan has a land area of nearly 58,000 sq. miles, a population of approximately 3,000,000 and a road system comprising about 70,000 miles of highways, exclusive of the streets in incorporated cities and villages. Geographically the state is divided into two unequal parts, commonly known as the Upper Peninsula and Lower Peninsula. The latter, lying between Lake Michigan on the west and Lake Huron, the St. Clair River, Lake St. Clair, the Detroit River and Lake Erie on the east, is considerably the larger in area and contains most of the principal cities. Its lower half is an important agricultural region, while the upper half is composed largely of undeveloped territory. The Upper Peninsula is but little developed and is largely a mining region. In the undeveloped territory in the state the ratio of the road mileage to the area is naturally much less than in the southern portion of the Lower Peninsula.

State highway work began in Michigan a little over eight years ago, the enabling legislation, designated as the State Reward Road Law, becoming operative on July 1, 1905. This law and the system of state aid which it inaugurated are unique, as no other state has applied the state aid principle in exactly the same way. Stated briefly, the plan provides for the payment by the state to the local authorities of certain definite amounts per mile (designated as "rewards") for roads built by them. These local units are townships, counties and road districts. The state itself takes no part in the building of the roads except to provide, through the State Highway Department, certain general rules and regulations in accordance with which the roads must be built in order to be accepted by the state as state reward road. The department is also charged with the duty of giving instruction in the improvement of roads and bridges, collecting data on the work done in the state and distributing the state rewards provided for. The chief officials of the department are Frank F. Rogers, C. E., State Highway Commissioner, and Leroy C. Smith, Deputy Commissioner. Amendments to the highway laws of the state passed during the present year authorize the appointment of two deputies instead of one as heretofore.

Under the present highway laws, the work of highway improvement is carried on by townships, by good roads districts and by counties. Under the township system the highway work of a township is in charge of a township highway commissioner acting under the supervision of the township board. Road districts may be formed by any combination of townships, villages or cities forming a continuous area in any county. Road work in these districts is in charge of a body known as a board of good roads commissioners, consisting of one member from each township, incorporated village or city included in the district. Under the county system the work is in charge of a board of county road commissioners, not exceeding five in number. Whether or not a county shall operate under the county system is decided by the townships included in the county, a petition from not less than 10 per cent. of the resident freeholders in each of the several organized townships, villages and cities of the county being required to bring the matter up for consideration and a majority vote in favor of the adoption of the county system being necessary to carry the measure. In counties where the system is in operation all roads in townships, except county roads, are under the care and supervision of the township board and the highway commissioner, as in cases where the county system does not prevail. In the event that a county, in which road districts have been formed, subsequently adopts the county system, the road districts are automatically dissolved except for the completion of work under contract, and the funds of the district are paid back to the units composing it. Townships which have adopted the township road plan, as provided for by the law of 1895, and which have carried on work under that plan may continue under it until such time as the township votes to abolish it, and while working

AN UNUSUAL VIEW OF A ROAD IN WEXFORD COUNTY, MICH.—SHOWING BOTH THE NEW ROAD AND THE PROFILE OF OLD ROAD.

TRAP ROCK MACADAM ROAD UNDER CONSTRUCTION—SHOWING LOWER COURSE OF STONE—HOMESTEAD ROAD, DICKINSON COUNTY, MICHIGAN.

HOMESTEAD ROAD SHOWN IN THE ILLUSTRATION AT THE LEFT—ROLLING SECOND COURSE OF STONE—LOWER OR FIRST COURSE IN FOREGROUND.

under the township system the town is not liable to any tax for the county road system without its consent, provided that the county in which the township is situated adopted the county system previous to 1913.

State rewards are paid to local authorities when roads of the different classes provided for by the state reward law have been completed in accordance with the specifications of the State Highway Department and have been accepted by it. According to the law as amended by the last Legislature, there are seven classes of state reward roads, one new class having been added by the 1913 law. These classes are as follows:

Class A consists of roads having no grades exceeding 6 per cent. (except where this minimum is found impracticable and a steeper grade is allowed by the State Highway Commissioner), not less than 20 ft. wide between side ditches and having "a wagon way or traveled track not less than 9 ft. wide, made of a mixture of sand and clay or other material." The reward for roads of this class is $250 per mile, with an extra $25 per mile for each additional foot of width in excess of 9 ft. up to and including 16 ft.

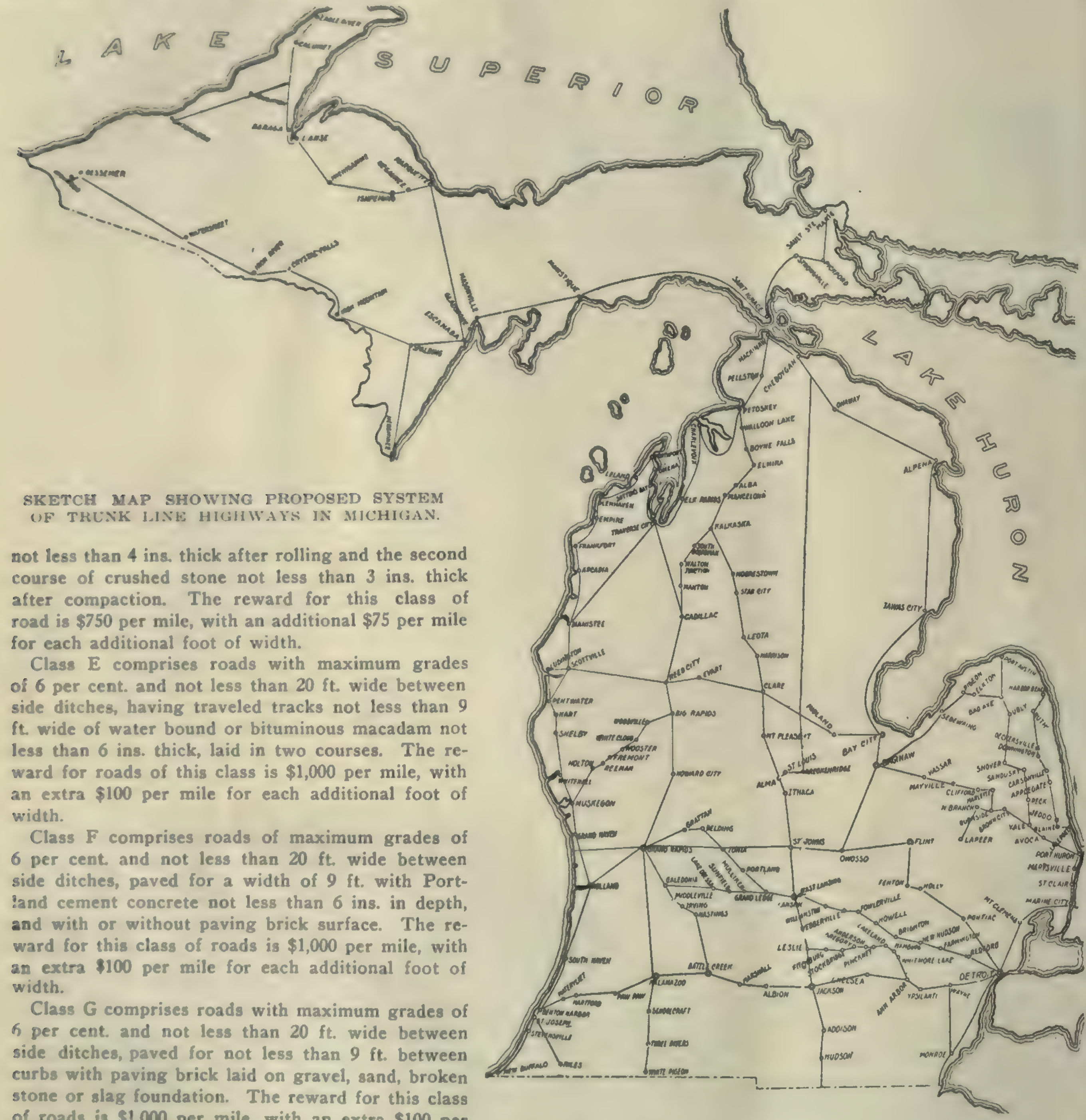
Class B consists of roads of the same maximum grade as those of Class A and of like width between ditches and of traveled track, consisting of "not less than 8 ins. of compacted gravel or not less than 12 ins. of compacted burnt shale, which must be applied in not less than two layers, each layer to be rolled separately." The reward for these roads is $500 per mile, with an extra $50 per mile for each additional foot in width of metal surface exceeding 9 ft. and not exceeding 16 ft.

Class C comprises roads with grades not exceeding 6 per cent., not less than 20 ft. wide between side ditches and with traveled tracks not less than 9 ft. wide, "made in two courses, the bottom course to be crushed stone, slag or other material, if approved by the State Highway Commissioner," and not less than 4 ins. thick after rolling, and a top course consisting of a layer of gravel or blast furnace slag not less than 3 ins. thick after rolling. The reward for Class

VIEW ON THE BAY SHORE ROAD IN GRAND TRAVERSE COUNTY, MICHIGAN—A STATE REWARD GRAVEL ROADWAY 15 FT. IN WIDTH.

C is $750 per mile, with an extra $75 per mile for each additional foot in width.

Class D comprises roads with a maximum grade of 6 per cent., 20 ft. wide between side ditches and with traveled tracks not less than 9 ft. wide, laid in two courses, the bottom course of gravel, slag or other material not less than 4 ins. thick after rolling and the second course of crushed stone not less than 3 ins. thick after compaction. The reward for this class of road is $750 per mile, with an additional $75 per mile for each additional foot of width.



SKETCH MAP SHOWING PROPOSED SYSTEM OF TRUNK LINE HIGHWAYS IN MICHIGAN.

Class E comprises roads with maximum grades of 6 per cent. and not less than 20 ft. wide between side ditches, having traveled tracks not less than 9 ft. wide of water bound or bituminous macadam not less than 6 ins. thick, laid in two courses. The reward for roads of this class is $1,000 per mile, with an extra $100 per mile for each additional foot of width.

Class F comprises roads of maximum grades of 6 per cent. and not less than 20 ft. wide between side ditches, paved for a width of 9 ft. with Portland cement concrete not less than 6 ins. in depth, and with or without paving brick surface. The reward for this class of roads is $1,000 per mile, with an extra $100 per mile for each additional foot of width.

Class G comprises roads with maximum grades of 6 per cent. and not less than 20 ft. wide between side ditches, paved for not less than 9 ft. between curbs with paving brick laid on gravel, sand, broken stone or slag foundation. The reward for this class of roads is $1,000 per mile, with an extra $100 per mile for each additional foot of width.

Claims for reward for more than 4 miles of road in any one surveyed township during any one fiscal year can not be allowed by the State Highway Commissioner, according to the present law. A partial exception is made to this in cases where townships or counties have raised money by taxation or by bond issues and have built a mile or more of road meriting state reward. In such cases, if the road has been approved by the commissioner and if it is kept in as good condition as when the approval was given, the application of the township or county may remain on the books of the highway department and draw from the state reward fund each year until such time as the township or county has received the amount due as reward for the road. The State Highway Commissioner is also empowered by the law to refuse to grant further rewards to any township or county that has received rewards and has not then kept the roads in proper repair. In such cases it is the duty of the commissioner to advise the town or county of the necessary repairs and to reinstate them to the eligible reward list provided they make the repairs. If, however, the township or county fails to make the repairs ordered, within a reasonable time, the commissioner is empowered to have the repairs made and to pay for them out of the reward money earned by the township or county. An amendment passed by the last Legislature also provides that any township or county which replaces or widens the metaled surface of any road on which it has received state reward, thereby raising the road from one class to a higher class or increasing its width, may receive the difference between the reward already paid and the reward which would be paid for the road had the entire construction been new. In this work, however, it is necessary for the township or county to advise the State Highway Commissioner of its intention before beginning work and to carry the work on in accordance with specifications furnished or approved by the commissioner. Another amendment provides that on or before Dec. 1 of each year a portion of the appropriations for state highway purposes equal to 2 per cent. of the total state rewards that have been paid at that time shall be credited to a repair fund which shall be paid out after Dec. 1 of each year for repairs on state reward roads, in the same manner as the rewards are paid. This work, like construction, must be done in accordance with specifications prepared or approved by the State Highway Commissioner and the amount paid for the work to any township or county must not exceed 2 per cent. of the total state reward money paid to that county or township, not counting roads accepted and rewarded during the current calendar year.

During a period of about 7½ years, from the passage of the law up to 1913, 1,764 miles of state reward road were built. Up to June 30, 1911, appropriations for the use of the department had been made as shown in the accompanying table:

APPROPRIATION FOR THE STATE HIGHWAY DEPARTMENT OF MICHIGAN.

Fiscal Year ending June 30.	Current Expenses of the Department.	State Rewards.
1906	$10,000	$20,000
1907	10,000	50,000
1908	10,000	100,000
1909	10,000	150,000
1910	10,000	140,000
1911	10,000	140,000
1912	10,000	235,000
1913	10,000	235,000
Total (8 years)	$80,000	$1,070,000

In addition to these amounts, the last Legislature appropriated $150,000 as a deficiency appropriation; $450,000 for the state reward fund, of which $18,000 was for departmental expenses; and $200,000 for the state trunk line fund for the fiscal year of 1913, with an additional fund of $300,000 for the second fiscal year. Besides these amounts, the department, beginning Jan. 1, 1914, will receive the money derived from automobile licenses. This is expected to create a fund of about $750,000 the first year.

One of the most important laws passed by the last Legislature was that known as the "Trunk Line Highway Act," which provides for the establishment of a trunk line system of about 5,000 miles of roads. The accompanying sketch map shows the approximate location of the roads comprising this system, and the act is printed in full on this and the following page.

It has been estimated that the total expenditure for road building in Michigan during 1912 was in the neighborhood of $4,750,000, the estimate being based upon the total highway tax for each of the years from 1901 to 1911, inclusive. Although figures for the total expenditure during the present year are not available, it is probable that the total will be greater than that for last year and that it will amount to not far from $5,000,000.

In commenting upon the character of the work in the state and its cost, State Highway Commissioner Rogers says:

"It is probable that the workmanship on these roads has not been as perfect as it might have been had the state had more detailed supervision of the construction, yet the cost has been much less and incidentally the state has trained a large number of road builders located in every part of the state who will be of great assistance and save thousands of dollars to their different communities when they begin road building on a larger scale.

VIEW ON THE BAY SHORE STATE REWARD ROAD NORTH OF ESCANABA, DELTA COUNTY, MICHIGAN.

"For the most part Michigan is still building gravel and macadam roads, although a number of miles of concrete roadways have been built in the state—mostly in Wayne County. There is some discussion as to whether the kinds of roads we are building are good enough to economically withstand the traffic they are designed to bear. Perhaps in some instances they are not, but it can safely be said that 95 per cent. or more of the roads, all except those near the large cities, meet the needs of the locality building them; that they are economically meeting the traffic requirements, and that to build more expensive types of road would not only be extravagance but folly."

TRUNK LINE HIGHWAY ACT.

AN ACT to provide for the establishment, survey, improvement and maintenance of state reward trunk line highways, to provide for the payment of double state reward thereon, to define the duties of state, county, good roads district and township officers in regard thereto, and to appropriate funds to carry out the provisions thereof.

The People of the State of Michigan enact:

Section 1. Provision is hereby made for the establishment of state reward trunk line highways. These highways, which are laid out as hereinafter provided, shall be improved, surveyed, maintained and rewarded in accordance with the provisions of this act.

Sec. 2. The state reward trunk line highways shall be composed of the highways and bridges constituting the routes indicated in the following statement of divisions:

Division 1. Beginning near the southeast corner of the state and running to Monroe, Wayne, Detroit, Mt. Clemens, Marine City, St. Clair, Marysville, Port Huron, Lakeport, Blaine, Jeddo, Applegate, Carsonville, Downington, Deckerville, Ruth, Harbor Beach, with a branch from Port Huron to Avoca, Yale, Peck, Sandusky, Snover, Ubly, Bad Axe, Port Austin and from Yale to Brown City, Burnside, Marlette, Clifford, Mayville, Vassar to Saginaw, with a sub-branch from Burnside, North Branch to Lapeer.

Division 2. Beginning at Detroit on Woodward Avenue and running northwest via Pontiac, Holly, Fenton, Flint, Owosso, Saginaw, Bay City, Tawas City, Alpena, Onaway, Cheybogan, Mackinaw City; with a branch from Owosso to St. Johns, Ionia, Belding, Grattan, Grand Rapids, thence west on Fulton Street to Lake Michigan, with a branch from Saginaw through Sebewaing, Pigeon, Elkton, to Bax Axe, and from Grand Rapids to Holland.

Division 3. Beginning at the south line of the state on the meridian line running north by Hudson, Addison, Jackson, Lansing, St. Johns, Ithaca, Alma, St. Louis, Breckenridge, to the prime meridian line, then north along said meridian line as near as practicable through the state to connect with division number two where said highway crosses the meridian, with a branch from Alma north to Mt. Pleasant, Clare, Harrison, Leota, Star City, Moorestown, Kalkaska.

Division 4. Beginning at White Pigeon, running north to Three Rivers, Schoolcraft, Kalamazoo, Grand Rapids, Howard City, Big Rapids, Reed City and Cadillac to Traverse City, with a branch from Cadillac to Manton, Walton Junction, South

Boardman, Kalkaska, Mancelona, Alba, Elmira, Boyne Falls, Walloon Lake and Petoskey.

Division 5. Beginning at the state line south of Niles, running north through Niles, St. Joseph, Benton Harbor, Watervliet, also from New Buffalo through Stevensville to St. Joseph, South Haven, Holland, Grand Haven, Muskegon, Whitehall, Shelby, Hart, Pentwater, Ludington, Scottville, Manistee, Traverse City, Elk Rapids, Charlevoix, Petoskey, Pellston, Mackinaw City, with a branch from Scottville to Reed City, Evart, Clare, Midland and Bay City, with a branch from Manistee through Arcadia, Frankfort, Empire, Glen Haven, Leland, Northport, Omena, Sutton's Bay to Traverse City, with a branch from Muskegon through Holton, Reeman, Fremont, Wooster, White Cloud, Woodville to Big Rapids.

Division 6. Beginning on Michigan Avenue, in Detroit, via Wayne, Ypsilanti, Ann Arbor, Chelsea, Jackson, Albion, Marshall, Battle Creek, Kalamazoo, Paw Paw, Hartford, Watervliet, with a branch from Battle Creek to Hastings, to Irving, to Middleville (via the river road), to Caledonia, to Grand Rapids.

Division 7. Beginning at Saint Ignace and running westward to Manistique, Masonville, Gladstone, Escanaba, Spalding, Iron Mountain, Crystal Falls, Iron River, Watersmeet, Bessemer to Ironwood, with a branch from Spalding to Menominee; also a branch from Saint Ignace to some point north of Saint Ignace, thence through Pickford to Sault Ste. Marie, over a route to be designated by the State Highway Commissioner.

Division 8. Beginning at Escanaba and running northerly to Marquette, thence to Negaunee, Ishpeming, Michigamme, L'Anse, and Baraga to Calumet, to Eagle River, with a branch line from Houghton to Ontonagon.

Division 9. Beginning at the city limits of Detroit on Grand River Avenue, and running northwesterly to Redford, Farmington, New Hudson, Brighton, Howell, Fowlerville, Webberville, Williamston, East Lansing, Lansing, Grand Ledge, Portland and Ionia, with a branch running westerly through Mulliken, Sunfield, Lake Odessa, then westerly to connect with the county road of Kent County, about two miles north of the south county line of Kent County.

Division 10. Beginning at Ann Arbor, running to Whitmore Lake, Hamburg, Lakeland, Pinckney, Anderson, Gregory, Stockbridge, Fitchburg and connecting with the main line at or near Leslie: Provided, That upon petition of two or more contiguous counties through their boards of county road commissioners in counties under the county road system, or through their boards of supervisors in other counties, or upon his own action, the State Highway Commissioner shall make preliminary surveys and such other investigations as he shall deem necessary of one or more routes for state reward trunk line highways, through such counties. After investigation the State Highway Commissioner shall submit to such county road commissioner, boards of supervisors, good roads district commissioners or township boards as the case may be, maps showing feasible routes and approximate estimates of cost of building over each of said routes, when the said boards shall concur upon one of such routes which shall then be known as a part of the state reward trunk line highway system. The maximum number of miles of trunk line highways which may be established in any county, shall be computed by multiplying the number of surveyed townships by three, fractional townships to be computed pro rata.

Sec. 3. Whenever any county, good roads district or township shall file notice with the state highway department through its proper officers that arrangements have been made or sufficient funds raised to improve three miles or more of road which is a part of the state reward trunk line highway system previously established according to the provisions of this act, and shall ask for survey, plans and specifications, and shall make application for state reward under provisions of this act, it shall be the duty of the State Highway Commissioner to enter such application and cause the road to be surveyed and have plans and specifications prepared. When any county under the county road system, or good roads district or township shall build two miles or more of such road, the same shall be inspected by an engineer under the directions of the State Highway Commissioner, and if found to be up to the required standard, shall be entitled to and paid double the legal state reward as provided and specified in chapter 5, act No. 283 of the Public Acts of 1909, as amended or as may hereafter be amended.

Sec. 4. The state highway department shall design all bridges and culverts and construct all bridges greater than thirty-foot clear span on state reward trunk line highways: Provided, That no bridges shall be constructed before the county, good roads district or township has funds available to construct at least three miles of road which includes the bridge site.

Sec. 5. Old state reward roads, which are or become part of the state reward trunk line highway system, shall be, if in perfect repair, entitled to one-half additional state reward, or if such old rewarded roads be widened or resurfaced, or both, then shall the county, good roads district or township be entitled to an added reward equal to the difference between the reward paid and the legal reward under this act.

Sec. 6. The State Highway Commissioner is hereby given the authority to refuse to grant any further trunk line road reward to any township, good roads district or county that has been rewarded by the state for improving roads that do not keep these trunk line rewarded roads in repair, but upon his refusal to any township, good roads district or county for an allotment of trunk line reward, it shall be the commissioner's duty to inform the proper officials of what repairs are necessary to place them in a position to again be eligible to receive trunk line reward, and if these repairs are made satisfactorily to the commissioner, he shall reinstate them to the eligible trunk line reward list: Provided, That if no reward is due said county, good roads district or township, then the State Highway Commissioner is given authority to make the necessary repairs and to render a bill for the repairs to the proper officers of such county, good roads district or township. This bill shall be paid upon the warrant of such officers, and the supervisors shall include the amount in the next regular tax roll.

Sec. 7. There is hereby appropriated for the state highway department for the fiscal year ending June 30, 1914, the sum of $200,000, and for the fiscal year ending June 30, 1915, the sum of $300,000, which shall constitute a fund for the payment of the additional state reward on trunk line highways, building or repairing bridges on such highways, and paying the salaries and running expenses incurred by this act. Any moneys remaining in this fund at the close of any fiscal year shall be carried over by the auditor-general and added to the funds which become available for the following year.

Sec. 8. The auditor-general shall incorporate in the state tax for the year 1913, the sum of $200,000, and for the year of 1914, the sum of $300,000, which amount, when collected, shall be credited to the general fund to reimburse the same for moneys hereby appropriated.

Sec. 9. The State Highway Commissioner shall, as soon as practicable after the taking effect of this act, cause preliminary surveys to be made and establish the routes of the several divisions of the state trunk line highways herein provided for, and he is hereby empowered to employ such engineers, clerks and other employees as may be necessary to carry out the provisions of this act.

This act is ordered to take immediate effect.

The Surface Oiling of Macadam Roads has proved satisfactory in the Philippines, according to the "Quarterly Bulletin" of the Bureau of Public Works. Gravel is used for covering the surface after oiling instead of sand, and rollers are not used, the traffic apparently being sufficient to consolidate the binder and gravel.

Increasing the Height of Curbs has been suggested in a communication to the "Daily Graphic" of London, England, and has been commented upon by "The Surveyor and Municipal and County Engineer," an English engineering publication. It is argued that the present curbs are not high enough to protect pedestrians on the sidewalk from the dangers of heavy motor traffic, and it has been suggested that the curbs be built higher than at present. The "Surveyor" suggests that the point is an interesting one upon which discussion could be had.

Surveying the National Pike, in Belmont County, O., has been started under the direction of Engineer W. C. Fawcett. This work is preliminary to paving the pike its entire length of 26 miles through the county, which, according to plans, will be accomplished during 1914. It is estimated that several months will be required to complete the survey of the road and to determine the necessary changes in grade. The section through Belmont County is one of several for which plans for improvement are being made.

National Forest Receipts in Wyoming for the past fiscal year, of which 10 per cent. is available for the construction of roads and trails in the state, amount to over $120,000. This 10 per cent. constitutes a "roads and trails fund" created by Congress for the benefit of local communities and its use is in addition to that of the state's share of the 25 per cent. of the gross income from this source allotted to the states for roads and schools. A new road has just been constructed by the Forest Service between the entrance to Cottonwood Creek canyon and Cottonwood Lake in the Wyoming National Forest. The road is 6 miles long and makes accessible to farmers in Star Valley a large tract of fir, pine and Engelmann spruce timber. The roads built by the Forest Service are considered especially valuable in fire protection work.

Street Repair Plant of the Borough of Manhattan, New York City

An asphalt and general highway repair plant is being erected by the Borough of Manhattan, New York City, on the block bounded by 90th St., Ave. A, 91st St. and the East River. It is expected that the work of construction will be finished and the plant ready for operation within a few weeks.

The plant, which when completed will have the largest capacity of any municipally owned plant in the world, will comprise several connecting buildings and a large yard.

The buildings include the asphalt plant proper, or main building, a four-story structure 58 by 95 ft., a power house and coal storage 84 by 63 ft., a sand and stone storage 86 by 45 ft. and an office building 35 by 55 ft. The walls of the main building are of corrugated iron. The walls of the power house are brick. Those of the coal bin and stone and sand storage are of concrete to a height of 15 ft. and, above that, corrugated iron. The first floors of all the buildings are concrete, and the upper floors of the main building are reinforced concrete.

MANHATTAN STREET REPAIR PLANT UNDER CONSTRUCTION—VIEW FROM AVENUE A.

SAME AS ILLUSTRATION OPPOSITE BUT VIEWED FROM THE EAST RIVER.

The yard in which will be located the general highway repair plant has a frontage of 542 ft. on 90th St., 201 ft. on Ave. A and 362 ft. on 91st St. It will be surrounded by a brick wall. Facing the East River in the rear of the plant are a bulkhead and a dock built of stone and concrete, 250 ft. in length. All material will be transported to the plant by water, and the dock will be equipped with a derrick and boom operated by a 10x12, double-cylinder hoisting engine, driven by steam from an 80-HP. boiler. To provide for emergencies there is also an auxiliary steam line from the main power plant to the dock. Stone, gravel and sand, together with the coal supply for the plant, will be hoisted from lighters in clam shell buckets of 40 cu. ft. capacity, dumped into cars, carried a distance of 460 ft. by an elevated railroad running over the tops of the buildings and deposited through the roof into hoppers and thence into the storage bins. Coal for all the buildings within the jurisdiction of the Borough of Manhattan, about 40 in number, will be stored at the plant and will be brought from the dock over another railroad. All coal handling machinery was manufactured by the Mead-Morrison Mfg. Co. of New York, N. Y. Flux oil will be pumped from lighters on the river directly to the flux tank in the main building through a 6-in. pipe line.

The main power plant will comprise two 200-HP. Corliss engines, two 250-HP. Babcock water tube boilers, one 200-HP. feed water heater and an air compressor for agitating the asphalt in the heating kettles. Steam can also be used for this purpose if desired. Space has been provided for doubling the capacity of the power plant if necessity arises. Gases from the furnaces will be disposed of through a steel stack 5 ft. in diameter and 100 ft. high. This stack, together with all steel work for the plant, oil tanks and kettles, was fabricated by the Dover Boiler Works of New York, N. Y.

On the first floor of the main building will be three rotary drum driers, made by the Traylor Engineering & Manufacturing Co. of New York, N. Y., each with an operating capacity of 30 tons per hour. Sand, stone and gravel will be conveyed from the storage bins to the driers by spiral screw and bucket conveyors. The conveying and elevating machinery was made by the H. W. Caldwell & Son Co. of New York, N. Y. Dust will be removed by passing gases from the driers through a 60-ft. flue into which are projected four sprays of salt water supplied from the river by means of a rotary pump. Forced draft for the driers will be supplied by a steam rotary fan blower of 15,000 ft. air capacity per minute, driven by an independent engine. The fan was made by the Buffalo Forge Co. of New York, N. Y. All engines used in the plant were made by the A. D. Granger Co. of New York, N. Y. The flux tank will be placed on the first floor. It will have a capacity of 25,000 gals. and will be equipped with a radiator and heater to insure easy flow of the oil. Lockers, showers, toilets, etc., for the workmen will also be situated on the first floor.

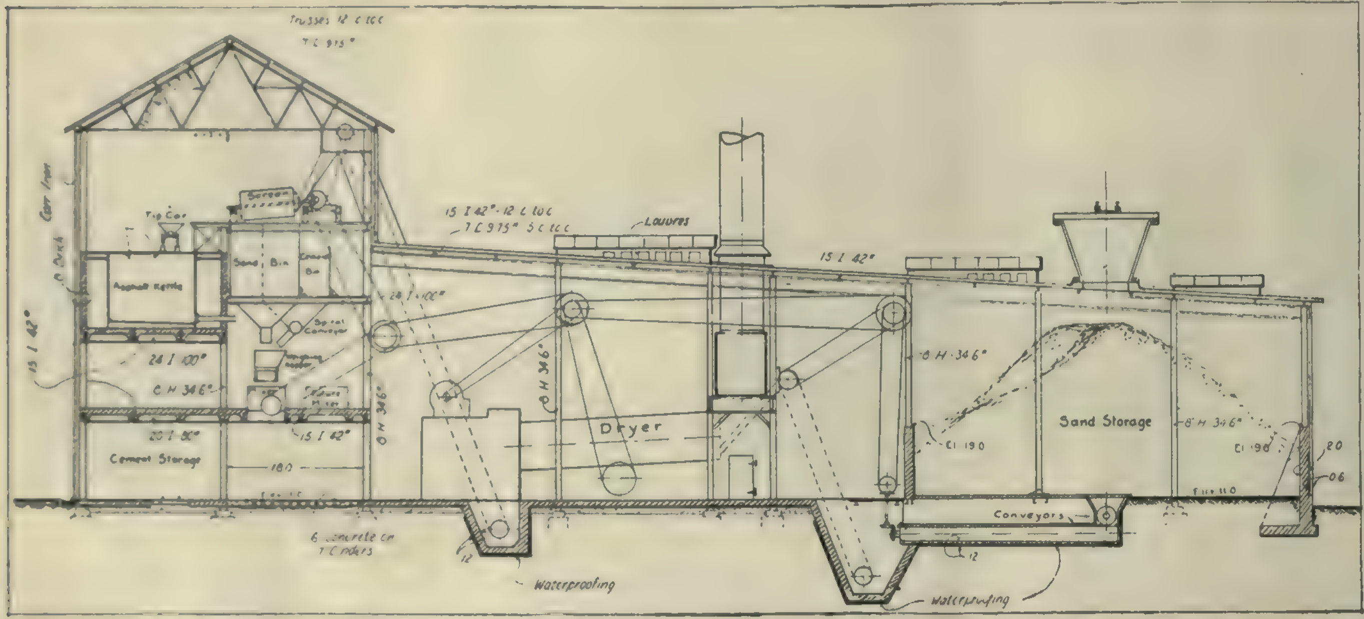
Two asphalt mixers built by the Iroquois Works of the Barber Asphalt Paving Co., of Philadelphia, Pa., each of 16 cu. ft. capacity, one for binder and one for topping, will be located on the second floor. Asphaltic cement will flow from the kettles on the floor above, and sand, stone, etc., will be supplied by cut-off chutes from the bins which will be on the third floor. Space has been reserved for a third mixer if needed.

Three asphalt kettles, each of 20 tons capacity, will be on the third floor. The oil will be conveyed to the kettles from the storage tank on the first floor, first passing through the weighing tank on the fourth floor, by means of an automatic reciprocating pump, governed from the kettle floor. The asphalt, which will be stored in steel containers on the ground floor, will be hoisted to the fourth floor and dumped into the kettles through chutes in the floor. The asphalt will be heated by steam coils in the bottom of the tanks, the condensation being returned to the boilers through the feed water heater. There will be three bins, one two-compartment bin for stone and sand, one for sand alone and one for cement. The materials will flow by gravity into weighing hoppers and thence into the mixers on the floor below. On the top floor will be located rotary sand screens, an industrial railway for conveying asphalt from the elevator to the kettles and a weighing car for weighing charges of flux oil.

A roadway will run through the first floor under the mixers, and the mixed material will be discharged through hoppers into wagons in which it will be hauled to the locality where it is to be laid.

The temperature of each charge of sand, stone and asphalt will be automatically recorded, as will also the average temperature of each load of mixture as it leaves the plant. From first to last, the material will be handled entirely by machinery, no hand work being necessary in any process.

A small chemical laboratory will be maintained in connection with the plant. It is expected that the plant will turn out from 3,500 to 4,000 sq. yds. of sheet asphalt pavement per 8-hour day.



MANHATTAN STREET REPAIR PLANT—CROSS SECTION THROUGH ASPHALT PLANT.

As soon as the work of constructing the plant is finished, the borough will take charge of its own street work as far as repairs are concerned. The street repairing equipment at first will consist of eight 5-ton steam road rollers, fire wagons, small tools, etc. For a time materials will be transported to the work by contract. For this purpose the borough will be divided into zones and contracts will be let for delivering materials at unit prices within the several zones.

The estimated cost of the plant, including equipment, is $175,000. The construction of the plant and yard is being carried out by the Northeastern Construction Co. of New York, N. Y., at a contract price of $120,000. All of the machinery for the plant proper is on the ground and much of it has been installed.

The plans were drawn by E. P. Goodrich, Consulting Engineer for the Borough of Manhattan, and J. C. Wolfe, Assistant Engineer, Board of Public Works, Borough of Manhattan. Borough President George McAneny of Manhattan was largely instrumental in securing the construction of the plant.

Grade Crossing Elimination in Union County, New Jersey

The work of changing the grade and relocating the tracks of the Pennsylvania Railroad on its line through Union County, N. J., involves the elimination of fifteen grade crossings in Rahway and the town of Linden, the vacating of several streets in Rahway and the opening of new ones to take the places of the ones vacated. Of the total number of grade crossings to be abolished, twelve are in Rahway and three in Linden. Those in Rahway are at St. George's Ave., New Brunswick Ave., Inman Ave., Hazelwood Ave., Commerce St., Milton Ave., Cherry St., Irving St., Poplar St., Main St., Grand St. and Scott Ave., from west to east in the order named. The streets in the town of Linden are Stiles St., Wood Ave. and Linden Ave.

Of the twelve grade crossings in Rahway, ten will be eliminated by elevating the railroad tracks. In the other two cases—the crossings at New Brunswick and Scott Aves.—the two streets will be depressed about 4 and 5 ft., respectively, and the tracks will be elevated enough to give the required headroom.

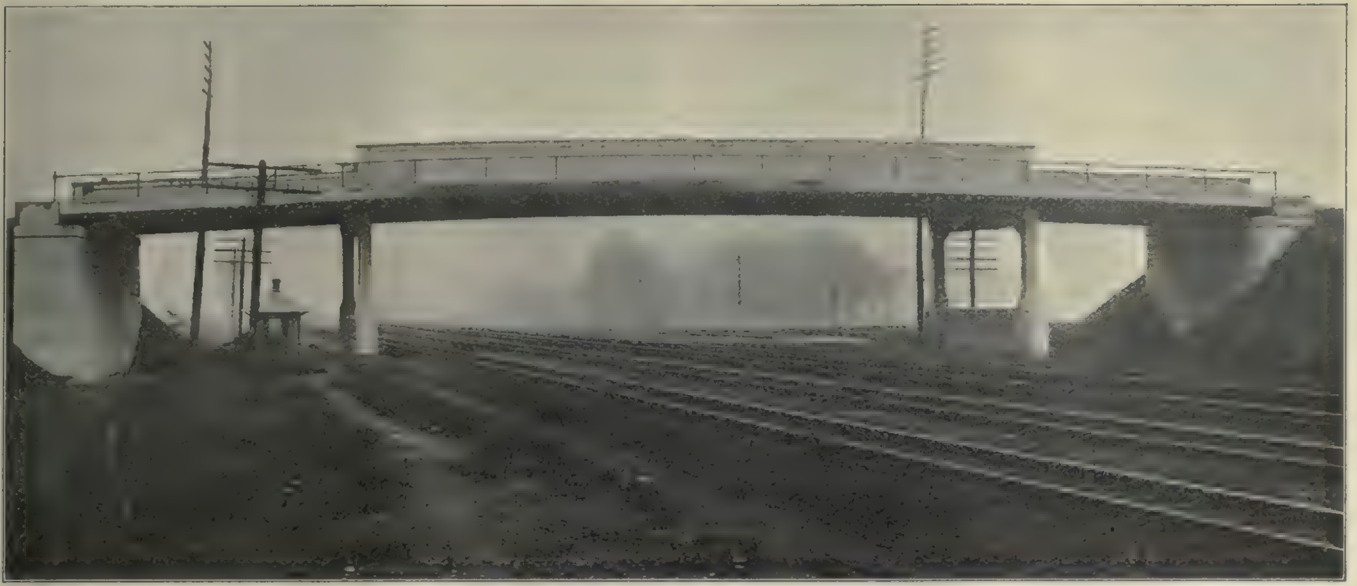
The work in Linden has been practically completed. In order to accomplish the elimination of the grade crossing at Wood Ave., it was necessary to depress the street about 8 ft. and raise the tracks by about the same amount. The roadway of Stiles St. has been depressed 5 ft.

At Linden Ave. the elimination has been effected by running the tracks at their old level, raising the grade of the street and carrying the street over the seven tracks on a bridge. The bridge is of lattice truss construction incased in concrete with a concrete floor paved with creosoted wood block.

It was necessary to raise the grade of the street for a total distance of 1,050 ft., 600 ft. on the north approach and 450 ft. on the south. The grade of the north approach is 4.5 per cent. and that of the south 4 per cent. The approaches are paved with bitulithic.

At Wood Ave. and Stiles St., Linden, where the street grades have been changed, the streets have been paved with vitrified brick on a 6-in. concrete foundation and provided with concrete curbs and sidewalks. This was done on Wood Ave. for a distance of 700 ft. and on Stiles St. a distance of 350 ft.

All the streets in Rahway whether the grade is changed or not will be paved in the same way for whatever distances



BRIDGE CARRYING LINDEN AVE., LINDEN, N. J., OVER TRACKS OF THE PENNSYLVANIA RAILROAD.

they are affected by the railroad's improvements. These streets are now of macadam as were those in Linden previous to their improvement. All of the streets in Rahway affected by the improvement are 66 ft. wide with the exception of St. George's Ave., which is 60 ft. wide. In Linden, Stiles St. is 45 ft. wide, Linden Ave. is 40 ft. wide and Wood Ave. is 80 ft.

The railroad bridges which carry the tracks over the streets are all of steel I-beam construction incased in concrete, either plain or reinforced as required. The floors of the bridges are of concrete, the tracks being carried on stone ballast, and the abutments are of concrete. Wherever possible the spans over the street are clear; when otherwise, steel columns are placed on curb lines in addition to the abutments. Four electric lights will be installed under each bridge.

On account of the angles at which some of the streets cross the tracks, some of the abutments are very long. This is true of the bridge at St. George's Ave. and that at the intersection of Irving and Cherry Sts., the bridge in each case being 250 ft. in length.

The tracks of the railroad have been raised to a uniform grade, about 16 ft. above the old level, for a distance of about 3½ miles in Rahway and Colonia and about 3 miles in Linden. Under the new plan, six tracks will eventually be carried in place of the four formerly running at street level. Two of the old tracks have already been removed and are in operation on the new level.

The new streets opened in Rahway by the railroad to compensate for those which the change of location of the railroad tracks made it necessary to vacate, include South Broad, 40 ft. wide and 500 ft. long; North Broad, 50 ft. wide and 1,100 ft. long; New Brunswick Ave., 66 ft. wide and 1,200 ft. long, and Bridge St., 50 ft. wide and 1,000 ft. long. These streets have been laid out and will eventually be paved with brick on a 6-in. concrete foundation. A plate girder bridge of two spans of 60 ft. each has been erected across the Rahway River on the line of Bridge St. All the new streets parallel the railroad.

In addition to the above, Meadow St. has been opened to pedestrians by building a tunnel under the tracks, 10 ft. high and 4 ft. wide. Sides, top and bottom of the tunnel are of concrete.

The work of grade crossing elimination, the opening and paving of the new streets and the improvement of the existing streets is being carried on by the railroad at its own expense. The crossings to be eliminated are all more or less dangerous. Rahway is a city of 10,000 population, fairly

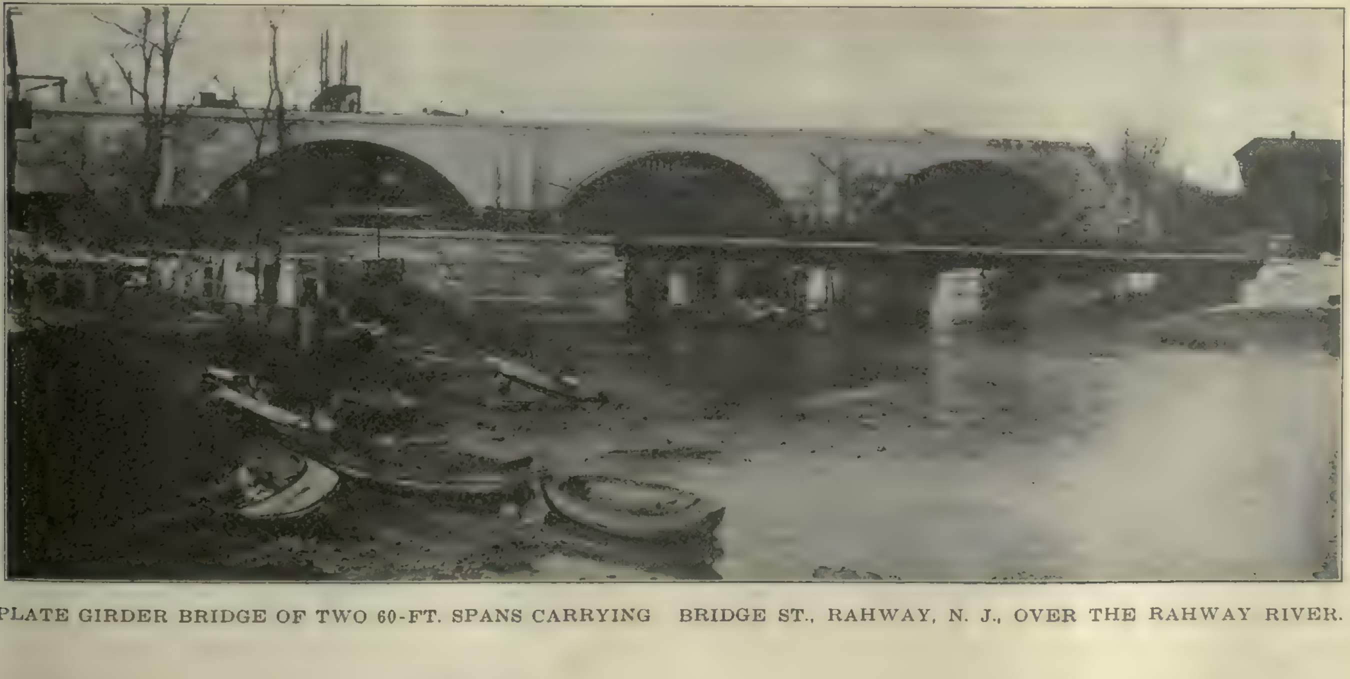


PLATE GIRDER BRIDGE OF TWO 60-FT. SPANS CARRYING BRIDGE ST., RAHWAY, N. J., OVER THE RAHWAY RIVER.

concentrated, and traffic on the railroad is heavy, the number of trains passing per day aggregating about 500. St. George's Ave. is a main traveled thoroughfare between New York City and New Jersey seaside resorts. All of the existing crossings are protected by gates and flagmen.

The work is being done by two contractors, the Keystone Construction Co., of Philadelphia, Pa., which has the section east of Inman Ave., Rahway, and the James McGraw Co., also of Philadelphia, which has the section west of Inman Ave. The work was commenced in April, 1912, and is expected to be completed in December, 1914. An ordinance is pending in the City Council of Elizabeth, providing for allowing the extension of the work through that city.

The Pennsylvania Railroad has expended the sum of $66,641,294 in the elimination of 1,052 grade crossings since 1902. There still remain on the 11,000 miles of line comprising the system 13,037 crossings at grade.

Experimental Work on Park Heights Avenue in Baltimore County, Maryland

A detailed report on the results obtained in the experimental road work on Park Heights Avenue, near the city of Baltimore, Md., appears in the September number of the "Proceedings" of the American Society of Civil Engineers. The report, which is by Major W. W. Crosby, forms a part of the report of the discussion of the topic "Cost Records and Reports" at the special meetings on road construction and maintenance held under the auspices of the society on January 17 and 18 of this year, and embodies cost data and conclusions drawn from the behavior of the experimental sections by Major Crosby.

This experimental work was fully described in "Good Roads" last fall in an article in which a detailed description of the construction of the sections was given. A table containing cost data on the construction and maintenance in 1911 and the maintenance from Jan. 1 to May 31, 1912, was also included in the article. In the report in the "Proceedings" the table containing this data has been brought up to the end of 1912. The article in "Good Roads" also included tables showing the results of traffic counts on several of the sections, and a table showing the analyses of the bituminous materials used. These tables are also printed in the "Proceedings," but are not reproduced here. In order to show the binder used and the construction costs on each of the sections, a part of the table on cost data, which was published in our previous article, is repeated here. The details of construction and fuller information regarding the binders used may be found by reference to the article in "Good Roads" of which mention has been made. ["Experimental Work on Park Heights Avenue," by Major W. W. Crosby, "Good Roads," Sept. 7, 1912, page 93.]

Briefly described, the work consisted of the construction of 29 sections of pitch macadam by the penetration method on Park Heights Ave., a street extending from the city limits of Baltimore, Md., northerly into Baltimore County. The experimental sections covered a length of a little over 6 1-3 miles and were put down in 1909 and 1910 under the supervision of the Maryland State Roads Commission, of which Major Crosby was at that time Chief Engineer. The first 3¼ miles have a trap rock surface 24 ft. wide, on the easterly side of which is an electric railway track and on the westerly side a 12-ft. earth roadway. Beyond this for 2/3 mile the roadway has the same kind of metaling, but an earth roadway replaces the tracks on the easterly side, while the shoulder on the westerly side is 5 ft. wide. For the remainder of the distance the metaling is of hard blue limestone, 14 ft. wide, with a 5-ft. earth shoulder on each side. The 2/3-mile stretch differs from the rest of the road in that instead of being of pitch macadam constructed by the penetration method it is of water bound macadam which was given a surface treatment of pitch. Except for two short stretches, on one of which the maximum grade is 2½ per cent. and on the other about 5 per cent., the grades on the road do not exceed 2 per cent.

In putting down the sections, the old macadam was scarified, reshaped and strengthened where necessary and then thoroughly compacted. A layer of clean crushed stone, varying in size from 1 to 2 ins., was then laid to a depth of about 4 ins., loose, being spread to give a crown of about ½ in. per ft. This was then rolled until the greatest possible compaction was secured, and the pitch treatment commenced. The method which was followed in the cases of all sections, except Nos. 15 and 16, was described as follows by Major Crosby.

"The pitch was heated until it flowed freely and then applied (by gravity alone) to the surface of the stone. Every effort was made to secure as even a distribution as possible. A coating of clean stone chips (passing a 1-in., and remaining on a ¼-in., screen) was then spread over the pitched road in sufficient quantity to take up any excess of pitch apparent on the surface and to fill the voids. The road was then again rolled and opened to traffic."

On sections 15 and 16, the macadam was practically "bound" with screenings and water. The surface was then swept clean of loose material and the pitch applied. The pitch used on these sections was a lighter and much more fluid material than that used on the remainder of the road, and it was applied cold and in smaller quantities. A few hours after the application, clean stone chippings were spread in sufficient quantities to take up any unabsorbed pitch remaining on the surface. The road was then lightly rolled and opened to traffic.

Slight variations were made in the general method of treatment on certain of the sections. For instance, in some the macadam courses were reversed, i. e., the coarser stone was used for the top layer. In some of the cases where this was done a layer of sand was applied and rolled in to partially fill the voids before the application of the pitch.

In Table 1 are given brief descriptions of the several sections, together with data on their construction and cost. Table 2 shows the net charges for construction and maintenance on each of the sections. The figures shown in this table take no account of the cost of any work except the pitching, it having been assumed in the preparation of the table that the expenditures for resurfacing the old macadam or putting it into condition to receive the treatment did not enter into the discussion; that the saving from not water binding the macadam resurfacing was negligible, and that the maintenance expenditures on the shoulders, earth side road, and ditches should be eliminated where separable. "The charges," Major Crosby states, "do not include any allowances for 'overhead expenses,' 'administration,' or 'engineering,' but cover all expenses for materials, labor, inspection, tools, etc., on the work, rental (or allowance

TABLE I.—DESCRIPTION AND CONSTRUCTION COSTS OF SECTIONS ON PARK HEIGHTS AVENUE.

					Construction of Macadam per Square Yard.			
Section.	Material.	Width, in ft.	Area, sq. yds.	Dates of use.	Gallons used per square yard.	Cost of resurfacing.	Cost of pitching, including shipping.	Total 1st cost.
1	Texas	30 35 24	11,226.11	July, Aug., '09	2.39	$0.337	$0.327	$0.664
2	Gulf Ref. Co. "Asphaltoil A"	24	1,936.00	Aug., Sept., '09	3.97	0.339	0.434	0.773
3	Texas	24	1,242.66	Sept., 1909	3.22	0.336	0.418	0.754
4	Imp. Prod. Co. "Fairfield"	24	1,173.33	Sept., 1909	3.67	0.337	0.449	0.786
5	U. G. I. No. 4—Sample No. 1	24	1,712.00	Sept., 1909	3.12	0.339	0.344	0.683
6	Warren-Puritan Brand No. 10	24	1,826.66	Sept., Oct., 1909	4.19	0.333	0.606	0.939
7	Tarvia X	24	1,909.33	October, 1909	5.40	0.337	0.618	0.955
8	Amer. Tar Co., "Tarite"	24	1,816.00	October, 1909	4.41	0.336	0.605	0.941
9	U. G. I.—(1909 work)	24	1,170.66	November, 1909	4.46	0.340	0.454	0.894
10	U. G. I.—(1910 work)	24	3,232.00	May, June, 1910	1.43	0.397	0.242	0.639
11	Texas	24	5,981.33	June, 1910	1.25	0.397	0.264	0.661
11a	Mixed—52 bbl	24	1,261.33	June, 1910	1.65	0.397	0.262	0.659
12	Headley Manf. Co	24	4,685.33	June, July, 1910	1.70	0.397	0.327	0.724
13	Barber Asphalt Co	24	4,202.66	July, Aug., 1910	1.45	0.397	0.325	0.722
14	"Fairfield"	24	3,184.00	Aug., Sept., 1910	1.69	0.397	0.292	0.689
15	"Fairfield Antidust"	18	5,808.00	October, 1910	0.61	0.397	0.084	0.481
16	U. G. I. "Antidust"	18	1,100.00	Sept., Oct., 1910	0.94	0.397	0.140	0.537
17	"Sarco"	12	3,568.00	October, 1910	1.42	0.397	0.325	0.722
18	Std. Oil (1910 work)	12	1,893.33	October, 1910	1.70	0.397	0.287	0.684
19	Std. Oil (1909 work)	14	127.55	November, 1909	3.92	0.241	0.410	0.651
20	U. G. I.	14	1,294.22	October, 1909	3.86	0.230	0.408	0.638
21	Texas	14	693.77	October, 1909	4.70	0.228	0.551	0.779
22	Gulf "Asphaltoil A"	14	976.88	October, 1909	2.95	0.229	0.405	0.634
23	Warren Puritan, Brand No. 17	14	844.66	October, 1909	4.71	0.224	0.691	0.915
24	U. G. I.	14	2,246.22	September, 1909	2.23	0.229	0.257	0.486
25	Imp. Prod. Co. "Fairfield"	14	1,532.22	September, 1909	2.73	0.228	0.353	0.581
26	Con. G. E. L. & P. Co. (complete top of U. G. I.)	14	3,758.22	August, 1909	2.98	0.216	0.303	0.519
27	Con. G. E. L. & P. Co	14	1,048.44	August, 1909	1.95	0.216	0.227	0.436
28	"Texaco Special"	14	863.33	Oct., Nov., 1910	1.25	0.607	0.355	0.962
29	"Glutrin"	12	13,398.67	Nov., 1909 Oct., Nov., 1910	0.45	0.318	0.074	0.392

therefor) on machinery used, etc., and in makeup follow the lines adopted for accounting by the State Roads Commission of Maryland." The following paragraphs from Major Crosby's report in the "Proceedings" embody the conclusions drawn by him from the work:

"Section 29, having been newly resurfaced with a fairly hard limestone water bound macadam in 1909, and having shown by the summer of 1910 a tendency to serious deterioration under the travel on it, and since the latter date having been treated (as apparently necessary) with glutrin, and now being in fully as good condition as before the treatment was begun, the speaker is of the opinion that:

"(a) A 12-ft., water bound, limestone macadam will not support successfully travel aggregating 400 units per average day of 10 hours, and where 60 per cent. of the total travel is that of motors.

"(b) Such a road surface can be made to sustain such travel, with physical satisfaction, by treating it with glutrin.

"(c) Such a road surface can be made to sustain such travel, with physical satisfaction, by giving it a surface treatment of 'cut-back Texas asphalt' (Section 28).

"(d) An 18-ft. water bound trap rock macadam is incapable of sustaining, without serious deterioration in a few months, travel aggregating 2,500 units per average day of 10 hours, and where 90 per cent. of the total travel is that of motors.

"(e) The surface treatment of such a road with a proper cut-back sludge asphalt, or a proper compound of water-gas tar, will enable it to sustain such travel, with physical satisfaction (Sections 15 and 16).

"(f) A 24-ft. pitch macadam, of either limestone or trap rock, will sustain, with at least physical satisfaction, travel aggregating as many as 15,000 units per average day of 10 hours, and when more than 95 per cent. of the total travel is that of motors (Sections 4 and 5).

"(g) A 14-ft. pitch macadam, of either limestone or trap rock, will sustain, with at least physical satisfaction, travel aggregating 5,000 units per average day of 10 hours, and

TABLE II.—NET CHARGES FOR CONSTRUCTION AND MAINTENANCE OF PITCH MACADAM ON PARK HEIGHTS AVE.

			Maintenance of Macadam, per Square Yard.								
Section.	Width, in feet.	Pitching (first cost) per sq. yd.	1910.	1911.	1912.	Total.	Average per year.	Yearly interest (6%) on first cost.	Yearly cost (average.)	Average of traffic census, Maryland units.	Average yearly cost (per sq. yd.) per traffic unit per ft. of width in mills.
1	24 to 35	$0.327	$0.088	$0.9011	$0.0036	$0.9927	(a)	....	....	....	....
2	24	0.434	0.080	0.0000	0.0959	0.1759	$0.0586	$0.0260	$0.0846	(b) 15,000	0.135
3	24	0.418	0.187	0.9947	0.0044	1.1861	(a)	....	....	....	....
4	24	0.449	0.081	0.0000	0.0031	0.0841	0.0280	0.0269	0.0549	9,600	0.137
5	24	0.344	0.081	0.0457	0.0034	0.1301	0.0434	0.0206	0.0640		0.160
6	24	0.606	0.079	0.0563	0.0434	0.1787	0.0596	0.0364	0.0960	7,200	0.320
7	24	0.618	0.082	0.0214	0.0135	0.1169	0.0390	0.0371	0.0761		0.254
8	24	0.605	0.080	0.0098	0.0583	0.1481	0.0494	0.0363	0.0857		0.286
9	24	0.454	0.091	0.0049	0.0171	0.1130	0.0377	0.0272	0.0649		0.216
10	24	0.242	....	0.0080	0.0052	0.0132	0.0666	0.0145	0.0211		0.070
11	24	0.264	....	0.0042	0.0039	0.0081	0.0041	0.0158	0.0199		0.066
11a	24	0.262	....	0.0298	0.0100	0.0398	0.0199	0.0157	0.0356	4,800	0.178
12	24	0.327	....	0.0349	0.0005	0.0354	0.0177	0.0196	0.0373		0.187
13	24	0.325	....	0.0101	0.0005	0.0106	0.0053	0.0195	0.0248		0.124
14	24	0.292	....	0.0118	0.0215	0.0333	0.0167	0.0175	0.0342		0.171
15	18	0.084	....	0.0335	0.0157	0.0492	0.0246	0.0050	0.0296	(b) 3,114	0.171
16	18	0.140	....	0.0980	0.0243	0.1223	0.0612	0.0084	0.0696		0.402
17	12	0.325	....	0.0161	0.0143	0.0304	0.0152	0.0195	0.0347	2,400	0.174
18	12	0.287	....	0.0343	0.0072	0.0415	0.0208	0.0172	0.0380		0.190
19	14	0.470	0.087	0.2663	0.0649	0.4182	0.1394	0.0282	0.1676	2,100	1.117
20	14	0.408	0.088	0.0845	0.0000	0.1725	0.0575	0.0245	0.0820		0.547
21	14	0.551	0.088	0.1805	0.0239	0.2924	0.0975	0.0331	0.1306		0.871
22	14	0.405	0.082	0.1851	0.0670	0.3341	0.1114	0.0243	0.1357		0.905
23	14	0.691	0.082	0.0756	0.0062	0.1638	0.0546	0.0415	0.0961		0.641
24	14	0.257	0.081	0.0555	0.0088	0.1453	0.0484	0.0154	0.0638		0.425
25	14	0.353	0.057	0.0763	0.0000	0.1333	0.0444	0.0212	0.0656		0.437
26	14	0.303	0.057	0.0286	0.0024	0.0880	0.0293	0.0182	0.0475		0.317
27	14	0.227	0.057	0.0056	0.0020	0.0646	0.0215	0.0136	0.0351	(b) 2,030	0.242
28	14	0.355	....	0.0092	0.0442	0.0534	0.0267	0.0213	0.0480	(b) 336	2.000
29	12	0.074	....	0.0308	0.0874	0.1182	0.0591	0.0044	0.0635		2.645

(a) Omitted from further consideration at this time because of recent construction. (b) From records; other units, approximations.

when less than 15 per cent. of the total travel is that of horse-drawn vehicles (Sections 17 to 27, inclusive).

"(h) The present indications are that the use of pitch in quantities of more than 1¾ gals. per sq. yd., in the construction of pitch macadam, where the upper course of the macadam is to be 3 ins. thick after compaction, is generally inadvisable.

"(i) The use of a flush coat, except possibly in the cases of pitches having unusual stability under the application of heat, is inadvisable in the construction of pitch macadam, unless the proportion of horse-drawn travel to motor travel is considerably higher than in this case.

"(j) with the use of materials susceptible to heat, or fairly so—such as most tars—the application of the pitch to the rolled stone can safely be stopped at a line parallel to and 1 ft. within the edges of the stone, and reliance can be felt that this border of the macadam, later, will be properly bound by the flow of the pitch under heat and travel.

"(k) With the use of asphaltic or blown-oil pitches, having a 'penetration' at normal temperatures harder than 150, the application of the pitch should be made fully to the edges of the rolled stone.

"(l) The requisite penetration of the pitch into the rolled stone is obtained when the pitch reaches to the bottom of the average sized stone in the course penetrated.

"(m) Success in the construction of pitch macadam depends primarily on the proper compaction of the macadam particles, and is directly proportioned to the success in rolling the macadam before spreading the pitch.

"(n) The use of sand on top of the pitch is open to grave objections, and the value of its use before spreading the pitch is questionable, clean stone chips or small gravel, free from particles which will not pass ⅛-in. mesh, being preferable.

"(o) With the use of a proper pitch, there is no material advantage in closing the finished pitch macadam to travel for a period after its construction, provided the adhesion of tires to the surface is prevented by watering, spreading an excess of grit, or by other means.

"(p) For pitch macadam, a pitch, to be satisfactory, should possess at least the following characteristics:

"(1) It should flow freely, though not excessively so, under the conditions of application.

"(2) It should show, after evaporation at 105° C. for 21 hours (20 grams in 3½-in. dish), a penetration of not less than 10 at 4° C., and not more than 100 at 25° C. (No. 2 needle, 100 grams, 5 sec.).

"(3) The naththa-soluble portions of the pitch, when evaporated on glass, should show themselves to be decidedly adhesive.

"(q) In the cases of tar pitches or pitch compounds, and for the purpose of lessening their susceptibility to temperature changes occurring after use, it is desirable that 'free carbon' (matter insoluble in carbon bisulphide) be present to an extent greater than a minimum percentage of the fractional distillate from such pitches between 225° and 300° C.; but, in order to avoid excessive hardness at low temperatures, this percentage of 'free carbon' should be less than a maximum—the minimum and maximum referred to being largely dependent, for their expression in figures, on the local conditions.

"(r) A 12-ft. width for the road metal is not economical where the travel aggregates more than 400 units per average day of 10 hours; nor is the 14-ft. width economical where the travel exceeds 2,000 units and the proportion of motor travel is more than 80 per cent. of the total.

"(s) Where high-speed motor travel forms a large proportion of the total, the unit width of travel lines should be considered as 9 or 10 ft., instead of 7 or 8 ft., as heretofore, because of the greater clearance required for the safe passing of the units of such travel.

"Further economic conclusions seem to be rather premature at this time, and such, including a deduction concerning the possible advantage of using an excess of pitch during construction in order to prolong the life of the pitch macadam, and perhaps in the end to reduce the cost, it would seem preferable to defer for two or three years."

Undergraduate Course in Chemistry for Highway Engineering Students

In a paper entitled "Chemistry of Bituminous Materials in the Civil Engineering Course" presented by Prevost Hubbard, of the Institute of Industrial Research, before the Society for the Promotion of Engineering Education at its twenty-first annual meeting, an undergraduate course in chemistry for students in civil engineering is recommended.

Beginning his paper with a statement of the necessity for the possession of a certain amount of chemical knowledge by the highway engineer, Mr. Hubbard cites the work in chemistry in the postgraduate course in highway engineering at Columbia University. The prerequisite for this course consists of the usual general course in inorganic chemistry covering the laws of chemical combination and the history, occurrence, preparation and properties of the elements and their principal compounds, which is given undergraduate students in civil engineering. Continuing, he states that, although the results obtained have been encouraging, the teaching of the course has been difficult because of the necessity for spending a certain amount of time on elementary subjects, which Mr. Hubbard believes, could be given in the undergraduate course to the benefit of not only the students who are to take the postgraduate course, but also of those who are not. He therefore recommends an undergraduate course in chemistry which is more comprehensive than the course required as a prerequisite to the postgraduate course, which would require but little more time than that course, and which would prove of greater value to the student in civil engineering who intended to become a highway engineer.

This suggested course is outlined by Mr. Hubbard as follows:

I. General Chemistry:
  a. Laws of chemical combination.
  b. History, occurrence, preparation and properties of the elements.
II. Inorganic Chemistry:
  a. Preparation and properties of the principal inorganic compounds with special reference to those occurring in ordinary structural materials.
  b. Classification and manufacture of inorganic materials of construction, such as iron, steel, cement, etc.
III. Organic Chemistry:
  a. Classification of and relation between the principal series of hydrocarbons, with little or no reference to their derivatives.
  b. Occurrence and properties of the native hydrocarbon deposits, such as petroleums, malthas and asphalts. (This subject to be treated in an elementary manner.)
  c. Manufacture and properties of such hydrocarbon products as coal gas, carburetted water gas, and coke, together with their by-products, especially tars. (This subject also to be treated in an elementary manner.)

This course, the author states, though comprehensive, could be treated, as a whole, with conciseness and, he believes would "tend to eliminate the very natural question regarding the necessity of the course in chemistry, which is apt to suggest itself to the undergraduate student in civil engineering and which tends to detract from his interest in chemistry as presented in the usual abstract way." Mr. Hubbard is of the opinion that though the supplementing of this course by brief laboratory courses in qualitative and quantitative analysis dealing principally with the structural materials which had previously been studied would not be absolutely necessary, yet such laboratory work would greatly enhance the value of the course.

State Highway Work in Massachusetts

Highway work in Massachusetts under the supervision of the State Highway Commission in 1912 included the completion of 32.82 miles of state highway and the building of 27.1 miles of roads under the "small town" act, according to the twentieth annual report of the commission, which is noted elsewhere in this issue.

The Massachusetts Highway Commission consists of Wm. D. Sohier, Chairman, F. D. Kemp and James W. Synan. The Secretary and Assistant Secretary are F. I. Bieler and Fred Fair, through whom the several departments report to the commission. The records of the commission are in charge of Mary A. Riley, Recording Secretary, and the accounting department is in charge of J. M. McCarthy. The engineering work is in charge of Chief Engineer A. W. Dean, whose assistant is S. A. Parsons. The office engineering department, in charge of A. M. Lovis, employs from 20 to 50 engineers, draftsmen, instrumentmen and rodmen, depending upon the season and the amount of work. For purposes of administration, the state is divided into four divisions, each in charge of a division engineer, who has one or two assistants in charge of special parts of the work, and as many resident engineers as may be necessary for the work in progress. The divisions, division engineers and assistant division engineers in 1912 were:

Division 1.—Hampden and Hampshire Counties and parts of Berkshire and Worcester Counties. Headquarters, Springfield. Division Engineer, J. A. Johnston; Assistant Division Engineer, A. D. Dadley.

Division 2.—Franklin County and parts of Hampshire and Worcester Counties. Headquarters, Greenfield. Division Engineer, C. H. Howes.

Division 3.—Middlesex, Essex and Suffolk Counties and parts of Worcester and Norfolk Counties. Headquarters, Boston. Division Engineer, F. C. Pillsbury; Assistant Division Engineer, D. H. Dickinson.

Division 4.—Bristol, Plymouth, Barnstable, Dukes and Nantucket Counties and part of Norfolk County. Headquarters, Middleborough. Division Engineer, W. R. Farrington; Assistant Division Engineers, W. P. Hammersley and H. C. Holden.

The work on Hoosac Mountain was in charge of Assistant Division Engineer H. D. Phillips, who was especially assigned to that work.

The 32.82 miles of construction completed during 1912 included 21.57 miles of road on which work was commenced during that year and 11.25 miles on which work was in progress at the beginning of the year. In addition, construction was commenced but had not been completed at the date of the report on 20.16 miles of road. Of the roads completed during the year about 2¾ miles were of gravel with a top surface bound with bituminous binder, a little over 3 miles were of sand bound with oil, approximately 4 miles were of water bound macadam to which an oil surface was applied, a little over 4½ miles were of water bound macadam, about 6¾ miles were of gravel, and the remaining mileage consisted of bituminous macadam—that is, macadam with a bituminous binder incorporated in the top course.

An important part of the work of the Massachusetts Highway Commission is what is known as the "small town work." In this work the state allots certain amounts to the towns to aid them in the improvement of their roads. Money is spent, so far as possible, on what may be called secondary roads, which are not only of local interest but are also feeders to the state highways. During 1912 roads were constructed in 54 towns and contracts were made but not completed in 29 towns. The total of the allotments for the year amounted to $72,784.75, and the total length built was 27.1 miles. Since the passage of the "small town" act, the total expenditure on the part of the state has been over $600,000 and the towns in which the work has been done have contributed $385,000, making a total of nearly $1,000,000 spent in this work. This sum has been used for the improvement of approximately 300 miles of roads in 135 towns. By the plan under which the commission worked last year the annual amounts available for this work were $25,000 for use in towns of less than $1,000,000 valuation in which no contribution was made, $25,000 for use in similar towns which contributed an equal amount and $25,000 for use in towns of over $1,000,000 valuation which contributed an equal amount. The Legislature of 1912, however, authorized the expenditure during the next five years of $1,000,000 a year for the construction of state roads and the improvement of small town roads. This, according to the report, will make available for work in the towns annual sums as follows: $50,000 in towns of less than $1,000,000 valuation where no contribution by the town is required, $50,000 for similar towns contributing an equal amount and $50,000 for towns of over $1,000,000 valuation which are required to contribute an equal amount. In the commission's report the following statement in regard to this small town work is given:

"The commission feels that the work which has been done in these 'small towns,' under proper methods and supervision, and the advice which is given to the towns for the improvement of their roads, is a most valuable work. In a short time it will result in the improvement of many miles of country roads, and the example set by one town will be followed by the next. In fact, there are few towns in this commonwealth which are not actively engaged in improving their roads and trying to improve their methods of construction and maintenance."

The total expenditures of the commission during 1912 amounted to $1,414,946.69. The principal items making up this total were as follows:

For construction	$361,384.04
For construction under "small town" acts	70,625.38
For road repair and maintenance, from revenue	208,686.71
For road repair and maintenance (motor vehicle fees fund)	489,649.18
For general expenses	49,932.57
For expenditures connected with automobile registration	77,501.34
For expense of examiners and investigators	20,743.78
For expenditures in connection with the operation, repair and maintenance of two bridges, one over the Merrimac River and one over the Taunton River	75,304.35
For the construction of a highway between Shelburne Falls and Green River Bridge	23,637.68

Of the total expenditure previously mentioned, about $11,500 is chargeable to telephone and telegraph supervision.

Considerable attention is given in the report to the subject of traffic records, about twenty pages of the report of the commission and the 28 pages occupied by Appendix L being devoted to it. The matter in the report is practically the same as that given in the paper presented by Chairman Sohier at the convention of the American Road Builders' Association at Cincinnati last December and included in the report of that meeting printed in "Good Roads." ["The Traffic Census as a Preliminary to Road Improvement," by Col. Wm. D. Sohier, "Good Roads," January 4, 1913, page 40.]

In the maintenance of state highways bituminous material was used during 1912 on 283.55 miles of road. The maintenance of state highways, according to the report, is a matter of vital importance because of the increasing mileage of the roads and the increase in the use of automobiles and motor trucks. The traffic records showed, according to the report,

LOCAL STONE MACADAM WITH ASPHALTIC "BLANKET COAT"—TOWN OF PALMER.

ROAD RESURFACED WITH 3-IN. COURSE OF TARVIA MACADAM—TOWN OF WESTMINSTER.

that during the past three years the traffic on state highways had increased over 40 per cent. and the automobile travel over 121 per cent.

"This traffic," the report states, "will in the future require the resurfacing of many miles of road with some more permanent material than water bound macadam, and undoubtedly many miles will require reconstruction at a large expense, as the upper 3 ins., at least, should consist of some bituminous macadam.

"It is probable that with this increase in travel many corners will require widening, and that, wherever possible, the present macadam should be widened from 15 to 18 ft. on all the main through lines.

"It is absolutely necessary today to apply some form of dust layer or bituminous binder to macadam roads, either by a surface application or by incorporating it with the upper 3 ins. of broken stone. If this is not done the roads will shortly be destroyed by the high speed motor vehicle travel."

During 1912 the commission spent over $500,000 in maintaining state highways; $200,000 of this was provided by direct appropriation by the Legislature and the balance came from motor vehicle fees. Over 2,000,000 gals. of bituminous material were used during the year on the maintenance of 283.55 miles of highway and in the construction of 21.38 miles. It is stated, also, that at the date of the report nearly 730 of the 920 miles of state highway laid out had been treated with bituminous material either in construction or maintenance. The report also states that although "it is true that many miles of state highways need reconstruction with a more permanent surface it is also true that the state highways are in better condition than they were three years ago." Commenting further on the question of maintenance, the report states as follows:

"It is evident that the cost of the maintenance of state highways will increase constantly, not only because of an increased mileage but even more because of the large increase in traffic. Many miles of state highway have now been built for more than eight years, and will have to be resurfaced in the immediate future.

"Under the present law the commonwealth collects from the city or town in which a state highway is located $50 a mile a year if it is spent, and 25 per cent. is collected from the county in which the highway lies.

"Until four years ago there was only $100 a mile available for the maintenance of state highways, and the state

ROAD ON CAPE COD—OIL-SAND BUILT BY THE LAYER METHOD—TOWN OF TRURO.

REINFORCED CONCRETE BEAM BRIDGE—18 FT. SPAN—TOWN OF NORTH ANDOVER.

REINFORCED CONCRETE ARCH BRIDGE—42 FT. SPAN—TOWN OF SPENCER.

appropriated only $100,000 a year for this purpose. Now the state appropriates $200,000 a year and there is $400,000 available from motor vehicle fees.

"The cost of maintaining the roads is over $500 a mile a year, and will probably be more in the future, certainly until many miles of the older roads on through routes, especially near the cities and larger towns where the traffic is extremely heavy, have been reconstructed with some more permanent surface. In many places the roads should be widened to at least 18 ft. to make them safe for the present traffic.

"It seems to the commission, therefore, that it would be wise at this time to provide for a more equitable distribution of the cost of this maintenance, putting a larger share on the cities or towns where the highways are located, but grading the amount to be collected per mile so that it will not be an undue burden on any poor town. The commission might be authorized, as it is under the present law, to exempt certain poor towns from any payment when the highway is a through route and the road of little or no value to the town.

"There are 125 towns with a valuation of less than $1,000,000, 77 towns with a valuation of over $1,000,000 and under $2,000,000, and 62 towns with a valuation of over $2,000,000 and less than $5,000,000.

"It would seem fair that the commonwealth should collect yearly from the cities and towns not more than one-half of the actual cost of such maintenance, but not to exceed $50 a mile a year in towns with a valuation of under $1,000,000, not to exceed $100 a mile a year in towns with a valuation of over $1,000,000 but under $2,000,000, and not to exceed $200 a mile a year in towns with a valuation of $2,000,000 but less than $5,000,000, and one-half of the actual cost from the cities or towns whose valuation exceeded $5,000,000.

"Such a charge would tend to equalize the cost of maintaining state highways and would put more nearly a fair share of such cost upon the municipality particularly benefited. It would also prevent the possibility of the amount collected for such maintenance as a part of the county tax becoming an unfair burden upon the cities and richer towns where very few miles of state highway are built.

"Before the road became a state highway the city or town had to pay the entire cost of its maintenance, so it would certainly seem fair that the richer cities and towns should pay one-half."

WATER BOUND MACADAM TREATED WITH COLD ASPHALTIC OIL—NEWTON STATE HIGHWAY.

Finance of Road Construction and Maintenance[*]

By G. MONTAGU HARRIS, M. A.[†]

Financial Responsibility for Roads

The first point which strikes one on reading the papers on this question is the almost universal recognition, in practice, that certain roads are of national rather than local importance and that the greater part, if not the whole, of the cost of such roads should be paid for out of general taxation.

England alone, of the countries reported upon, does not at present act from this point of view, but it is clear that there is a strong trend of opinion in favor of its adoption in that country.

Messrs. Berryman and Maybury (Great Britain) after citing the recent acts relating to road locomotives and motor cars, say: "These acts and the regulations made in pursuance thereof gave legal sanction to the enormous additional user of the highway which has followed the introduction of mechanical transport, both for rapid passenger and light goods traffic, and also for the carriage of merchandise by heavy motor cars. Since their enactment a new and totally different class of traffic has been brought upon the highway, which not only entails a correspondingly larger increase in expenditure, but from its nature and the resulting length of journeys performed, completely upsets all preconceived theories that highways were matters of solely local concern. Indeed, the urgent need for revision of the finances of road administration has already been clearly recognized by the Royal Commission on Local Taxation (1901), the Departmental Committee on Highway Administration (1903) and the Joint Select Committee on the Local Government Acts (Financial Adjustments) 1911." To these may be added the views of the road conference held in London in 1909 and of practically all local authorities and other public bodies concerned.

Everything, therefore, points to the fact that in every country public opinion is practically unanimous in favor of the institution of a system of national roads, the greater part of the cost of which should be paid out of the national exchequer.

There appear to be two reasons why the national exchequer should not bear the whole of this cost, but should obtain part of it from the local authorities.

One of these reasons does not apply to countries possessing a central road department which directly maintains all the national roads. In some countries, however, and especially in Great Britain, there is, for one reason or another, a strong feeling in favor of the actual work of road construction, maintenance and repair, in the case of all roads, being left to the local authorities. Where that system is adopted, it is generally considered that it would tend to extravagance if the local authorities were not obliged to find some proportion of the funds required.

The other and more general reason is that these roads are not a purely national service (like the army or navy) but also serve local conveniences, and it is therefore not fair that the taxpayer in a district in which there are few national roads should pay at the same rate as if he were in a district where there are many. Some portion of the fund necessary for this purpose should therefore be charged on the local authorities in proportion either to the mileage of or the expenditure on the national roads in their areas.

It must be admitted that this point of view does not seem to be generally recognized. In France, Italy and most of the German states, no contributions are levied from the local authorities for the national roads. The importance of the point must depend on the extent of national roads in relation to others and on the amount of the burden they involve.

In Hungary, it will have been observed, the amount of contributions to be paid by the local authorities towards the cost of the national roads is based in each case on a calculation involving a number of factors. This may very possibly result in complete justice being done, but it seems to be too complicated a system to be generally recommended. On the other hand, the rough and ready methods of Great Britain are based on no principle whatever and are altogether unsatisfactory.

The simplest method which would be approximately fair all around, where the cost is to be shared by the state and the local authorities, would be for the state to bear a fixed proportion of the cost subject to its inspectors being satisfied that the road is being efficiently maintained, and in the case of national roads it is generally held that the state's share of the expense should be not less than 75 per cent.

The question of the national roads which pass through towns stands on a somewhat different footing from that of roads in the open country. Mr. Haward (Great Britain) puts the matter thus:

"The difficulty of dealing with these areas lies in the fact that the greater portion of the traffic therein, even on the main roads, is of a local nature. While the classification already referred to could doubtless be applied to the roads in these areas it would seem to follow, if the greater part of the traffic in towns is of a local character, that the same proportion of the cost of the main roads therein should not be borne by the state as in the case of the counties. It is obvious, however, that the greater part of the through traffic which constitutes the 'national' element in the traffic on country main roads passed at some point or other through one or more of the great towns. It follows, therefore, that the main roads through such towns should be subsidized to an extent which bears some relation to the amount of such through traffic. If this principle be admitted, a solution of the problem might be found along the following lines: The grants already suggested for main trunk roads would work out at an average of £x per mile, which would represent roughly the cost of maintenance attributable to 'through' traffic along such roads. £x per mile might, therefore, be taken as the cost of maintenance due to 'through' traffic in London and the county boroughs, and grants might be given on that basis.

"In such areas, however, main roads frequently take the combined traffic of several main roads in the surrounding areas, as these roads usually converge and often unite when approaching an urban area, so that the cost per mile attributable to 'through' traffic in the latter would be higher than in rural areas. In order to counteract this inequality, the classification of roads in London and the county boroughs might be modified by amalgamating the first two classes and giving the higher grant in respect of all roads which are in any substantial degree 'main' roads. As an alternative, Class I (main trunk roads) in these areas might be subdivided into two or three grades, the grant per mile being a multiple of £x in the case of roads bearing more than the normal proportion of through traffic."

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[*] From the general report on Question 9—Finance of the Construction and Upkeep of Roads; Provision of Revenues—Third International Road Congress, London, England, June 23 to 28, 1913.

The first part of this report, which is omitted here, consists of outlines of the system of financing roads in each of the countries from which reports were submitted to the congress. In this outline, Mr. Harris divides roads into four classes, designated as national, provincial, district and vicinal roads and town streets, and considers the financial methods of each country as nearly as possible according to that classification. This portion of the general report consists principally of statistics on the total mileage of roads of the several classes and brief statements of the methods by which they are financed.

[†] Secretary to the County Councils' Association of England and Wales; General Reporter on Question 9.

As regards the question of financial responsibility for the classes of roads other than national, this must largely depend upon the arrangements with respect to administrative responsibility, which belong to Question 8. It may be said here, however, that there seems to be a consensus of opinion in favor of a substantial grant from the central government towards the cost of provincial roads, less of course than the proportion paid by the state in respect of national roads, but based on the same principles.

It is interesting to notice the detailed suggestions made by Messrs. Berryman and Maybury as to the proportion of cost of roads in England which in their opinion should be borne by the state. (Shown in the accompanying table.)

	Mileage; say	Approx. exp. per mile per ann. maintenance.	Approx. total expenditure maintenance.	Suggested proportion of total to be paid by state	Total amount of grant.
Class I	10,000	£210	£2,100,000	50%	£1,050,000
Class II	35,000	100	3,500,000	33⅓%	1,166,666
Class III	65,000	40	2,600,000	nil	......
Class IV	30,000	10	300,000	nil	......
	140,000	..	£8,500,000	....	£2,216,666

These proposals do not include town streets, and Messrs. Berryman and Maybury appear to place the state contribution to Class 1 roads much lower than would generally be accepted as equitable. The other English contributors suggest 75 per cent., which is the proportion usually named whenever the subject has been considered by any authoritative body in England.

It does not seem to be as a rule the practice, or to be thought desirable, that roads of a lower grade than provincial roads should receive a grant from the central government. Where, however, minor authorities are primarily responsible for such roads, grants are usually given to them by the larger local authorities at their discretion, and this seems to be a satisfactory system.

It is taken for granted that the larger towns, at any rate, are solely responsible for all their streets, although they may receive grants from the government for those which partake of the nature of national roads, as already mentioned. Mr. Jarratt (Great Britain) considers that the towns should also receive a government grant in respect of streets which might be said to fall within the same category as provincial roads and on the same basis, and the remarks by Mr. Haward with regard to main streets which are national roads should be again referred to in this connection.

The question of the propriety of charging either the taxpayers as a whole or the taxpayers (or "ratepayers") in a particular locality with the cost of the roads is practically solved when it is decided to treat the roads as a national concern. With regard to roads not so treated, however, a question often arises as to the propriety of charging the inhabitants of one area with the cost or a portion of the cost of roads situated in another. This resolves itself mainly into a question as between town and country.

Mr. Clifford Richardson (U. S. A.) in following out his thesis that the burden of financing the construction of improved roads of the highest type should be placed where it properly belongs, says:

"The larger proportion of the motor traffic on our roads is undoubtedly that of motor cars which are owned by city or suburban residents and, in consequence, the cities should pay a large proportion of the taxes for constructing and maintaining country roads, unless it can be definitely fixed upon the owners of the motor vehicles themselves by a special tax."

One special aspect of this point is sometimes overlooked, namely, that the heavy traffic from the towns is often in direct competition with the small tradesmen in the country, the large stores sending goods daily by heavy motors to country customers and being enabled to do so only by reason of the good roads which are paid for largely by those small tradesmen whose business suffers so severely from this class of competition.

Mr. Jarratt (Great Britain) urges that: "Steps taken to ascertain with accuracy the origin of traffic on either side of given boundaries separating populous centers from county areas, would undoubtedly show how vast is the interchange of traffic across such boundaries, and how intricate and complex is the question of differentiating, say, between a county and a county borough, as to their proper liability in respect of roads which bear such through traffic. It seems too readily assumed sometimes that the traffic originating in rural districts, on the outskirts of a large town, into and returning from the town, represents a town user of rural roads. But surely such traffic has all the essentials of mutuality and should not be a sole charge upon one of the parties."

Mr. Jarratt's statement as to the difficulty of fixing the liability of different local authorities with regard to the highways on each side of a boundary is, no doubt, true enough, but there can be little dispute that the volume of traffic originating in a large town and running into the country is much larger than that originating in the country and visiting the town. Where, therefore, there is no provision by general taxation or special taxation of vehicles which neutralizes this inequality, the town might fairly be called upon to contribute towards the cost of the roads in the adjoining areas.

Sources of Revenue

A large proportion of the funds required for roads, whether by the state or the local authorities, is met out of the product of their general system of taxation—that is to say, is obtained from precisely the same sources as the funds required for any other public service. Some part of these funds, however, is obtained by special taxation of persons or property.

It is unnecessary here to touch upon the question of the resources of the state from general taxation. There are, however, some points in connection with the general taxation by local authorities which it does seem desirable to take into consideration.

In many European countries the main source of revenue to the local authorities consists of "additional centimes" added to the direct state taxes. Thus, in order to meet the expenses of its highways in any one year, a French commune will calculate the number of centimes which, levied on the persons in its area liable for the four direct state taxes on the same basis as those taxes themselves, will bring in the required amount, and these centimes are then, for the benefit of the commune, added to the tax collected for state purposes. It is obvious that the effect of this system is that the burden of central and local taxation rests on precisely the same persons and property in precisely the same degree.

In England, on the other hand, the rates or local taxes may only be levied on fixed property, whereas the general taxation of the state has a far wider range, including in its field, through the income tax, all current revenue, whether real or personal.

It is not intended to discuss here which of these two systems is preferable. The difference, however, should be noted. In the first case the sources of central and local general taxation are the same, in the second they are different, and consequently the proportions of the expenditure on the roads which should be borne by the central and local authorities respectively should probably not be the same under the two systems.

The question next arises, what, if any, classes of persons or property should be specially taxed for the roads. As to this, there is one principle which is generally laid down in the papers submitted—namely, that, to a large extent at any rate, those who use the roads should pay for them. Almost every writer points out the unfairness of casting upon the community as a whole the entire charge of a service which, while it certainly does benefit the whole community to a certain extent, contributes directly to the business interests or the pleasure of certain very definite classes.

Signor Frosali (Italy) deals with the point in a concise paragraph. "The cost of road maintenance," he says, "should be borne, at least in great measure, by those who use the roads and who derive economic advantages from them for their undertakings. If it is considered fair that rural property should, as at present, contribute towards the roads, as they act as feeders for the conveyance of agricultural produce to the consumer, it is only fair that urban property and, generally speaking, buildings, should pay their share of the expense; since these roads are means of access to the houses and add to their value. Similarly, industrial undertakings should contribute towards these expenses, because the roads are used for the transport of the raw material, the workmen and the finished product. Again, commerce should also contribute its share, as it is a great road user."

Mr. Clifford Richardson (U. S. A.) puts forward some interesting and, to my mind, convincing arguments on the subject of long distance traffic. "A large proportion," he says, "of the improved highways which have recently been built in the United States may be looked upon as luxuries, since more than half of the travel which uses them consists of pleasure vehicles and motors and but a small proportion is made up of productive travel. * * * It would seem, therefore, that the costs of these expensive roads should be met, at least in some part, by revenues derived from the taxation of motor travel, and that a large portion of their maintenance should be paid for from the same source."

M. Bordas (France) says that, "among the inhabitants of a country some derive special advantages from good roads, such as those who use horses, carriages, vehicles with mechanical traction, and other means of rapid conveyance for their professions or for pleasure. In these circumstances it would be only fair for such parties to pay an additional tax in the form of a special duty." M. Bordas is here referring to national roads, but points out that the same principle is applied to roads of other classes by the Act of 1880, since under that act all those who are considered to derive the most benefit from the roads are called upon to contribute to the cost. Hence the system of contribution in labor and industrial subsidies.

As regards the question of heavy traffic in particular, the position is thus stated by Mr. Harcourt Clare (Great Britain):

"1. Are the few traders to be allowed to make a saving in railway charges at an expense to the general body of ratepayers many times in excess of the saving effected?

"2. Is it fair to the great majority of traders who use vehicles not carrying excessive weights, to have the roads cut up and themselves made to contribute to the damage caused by the excessive weights?

"3. Is it to be recognized that it is the duty of road authorities from time to time to incur whatever expenditure may be necessary to so maintain or reconstruct the roads under their control as to make them suitable for any vehicle which under the existing law can use a highway?"

Mr. Clare mentions that this point is recognized in English law in relation to "extraordinary traffic," but the method which is adopted in almost every other country of special taxation of industrial undertakings which use the roads to a greater extent than the general community, seems much more effective and satisfactory than a remedy which almost always involves a lawsuit.

It is curious that whereas in every country there appears to be some taxation of motor cars and, as a rule, of horse vehicles also, steam rollers and traction engines, so far as can be gathered from the information received, escape very easily, although they do the most damage of all. This is certainly the case in England.

One writer only, M. Guechoff (Bulgaria), is opposed to the principle of taxing vehicles and, indeed, to all special taxes for the roads. He argues that to make the incidence of taxation bear on all persons, vehicles and things, in proportion to the profits derived by them respectively from the use of roads, requires too many facts to be taken into consideration to be really practicable. Moreover, he says, if certain industries require transports which use the roads very much, they also contribute largely to the state, and he does not consider it necessary to impose a special tax on vehicles of a certain category, such as heavy motor cars, for instance, because, in his opinion, "the proper course is to reduce if not eliminate excessive wear and tear of roads by suitable police regulations and by adapting the roads to modern traffic requirements."

M. Guechoff, however, in this respect seems to be in a small minority, and the latter part of his argument is directly answered by Mr. Harcourt Clare, who says that within limits this principle is one that the authorities ought to recognize, but there comes a point when the exceptional use of the road by a very small number of individual traders compared to the greater number of traders using them causes an amount of damage to the roads entirely disproportionate to the wear and tear caused by the rest of the traffic.

Indeed, I think it may be taken as generally agreed that road vehicles, or, at any rate, some classes of them, should be taxed. The question then arises whether funds so realized should go to the state or the local authorities. The simplest answer to this question would be that it should depend on the area which the vehicles are likely to cover. On this principle, the main taxes on mechanically driven vehicles (or on petrol) would go primarily to the state, which should distribute a portion of this revenue among the local authorities, the amount reserved to the state depending upon the proportion of national roads to other roads in the country, and other questions of administration. The local authorities, however, should also have power to levy taxes on this class of traffic to a limited extent. The whole product of taxation on slower moving traffic should go to the local authorities, as is usually the case, but in view of the very different areas and systems of administration in the different countries it is impossible to lay down any rule as to which authorities should benefit, which would be applicable to all countries. It should be observed, however, that it would not be fair that the whole revenue raised locally by the taxation of vehicles should be enjoyed by the taxing authority from within whose area the traffic emanates, unless such area is fairly wide, and that, from this point of view, the country districts adjoining a town should have some share of this source of revenue.

One method of raising funds for the roads from those who use them is the system of tolls. This system is, however, almost universally recognized at the present day as an anachronism. The only writer of a paper who supports them is M. Meyen (Russia), and he shows how a large proportion of the cost of maintenance of roads in Russia is met out of tolls. In the government of Moscow this proportion amounts to as much as 50 per cent. In other cases, however, where a road has lost its importance owing, for instance, to the introduction of a branch line of railway, the cost of collection has been greater than the receipts, and consequently the toll has been abolished. In Russia the rate of tolls differs in summer and winter. The special system of tolls on station roads which is in force in Hungary and is described in detail by Messrs. Nemethy and Keviczky is of some interest and there is more to be said for this than for the general system. It appears, however, that the method of accounts which is involved as between the road authorities and the railway companies is far from satisfactory and leads to many difficulties. The system of taxing per unit of weight all goods carried to or from a railway station (also mentioned by M. Meyen) is somewhat of the same nature.

Mr. Berryman, in his historical summary, shows how the system of tolls, when in force in England, brought about a vast improvement in the roads, but he acknowledges that a recourse to that system may, in practice, be dismissed as incompatible with existing conditions, and it is clear that (except perhaps in Russia) there is a very general tendency to abolish tolls wherever they still exist.

The system of assisting the work of road maintenance by a forced contribution in labor or its equivalent in money is recognized in most European countries, but has been completely abandoned in Great Britain. Its essential characteristic is the possibility of contributing in the form either of money or labor, and M. Meyen (Russia) especially commends this system, expressing the opinion that the contribution should be based on the extent of land and the number of draught animals and vehicles belonging to each inhabitant. He urges, moreover, that this tax should (as in France) vary in different districts, since the value of a day's work varies according to local conditions, and consequently the rate of this tax should be fixed by the local authorities. It should not exceed, he thinks, three days in the year for each horse or vehicle and no one should be obliged to travel more than 15 versts to fulfill his task. This task partakes of the nature either of general local taxation or of special taxation according to the basis upon which it is levied. If it is levied merely as a capitation tax it is of course unfair, as is strongly urged by M. Meyen and M. Guechoff.

Tramway companies are usually obliged to pay their share of expense in respect of the user of a road, and rents or rates are as a rule obtained from those who either lay pipes beneath the road or erect posts and carry wires above it.

Fines for convictions for offences connected with the roads are sometimes an appreciable source of revenue, and in one country (France) those who are unable to pay are forced to do labor on the roads instead.

Among other miscellaneous resources are the sale of grass and timber by the highway authorities; and in some countries the harvest from the fruit trees alongside of the roads brings in a considerable income.

Permits for standing on ranks and rental of space on the public thoroughfares apply rather to town streets than to roads generally, and here it must be said that the information given in the different papers as to the special financial problems of towns is so slight, except in the paper by Messrs. Timme and Petri, that it is impossible to make any comparison of the practice in different countries as to the liability of frontagers to make up new streets, to pay for the maintenance of footpaths, and so forth. The few particulars already given from Messrs. Timme and Petri's paper give some illustrations of the position in different states of the German Empire, and, for more complete information the paper itself should be carefully studied.

One suggestion as to a form of relief to the taxpayer or ratepayer in respect of road expenditure requires special mention. Messrs. Nemethy and Keviczky (Hungary) argue at length that masons, carpenters, bricklayers, pavers and the like should during the period of their military service be employed on road work, or even that all privates might be so employed for, at any rate, a few days in the year. Assuming that the men received a small bonus a day in respect of this work, it is pointed out what an enormous saving this would be to the public funds and what a large extension and improvement of roads would be the result, while it is also contended that it would be a useful form of training. This suggestion does not, of course, touch those countries in which conscription is not in force, but the Congress may think it worthy of consideration.

Loans

The system of contracting loans for purposes of road construction is very generally adopted, though in a varying degree in different countries. From the urgency with which M. Guechoff demands the raising of loans in Bulgaria for this purpose, it would seem that the system is not yet in force in that country. In France the Conseil General may raise loans which are repayable within a period not exceeding 15 years, provided that the number of centimes required to meet the sinking fund does not exceed the limit specified in the budget. If there is such excess, or if the period of repayment exceeds 15 years, a special act is necessary. Among the German towns the average period for repayment of loans is 30 years.

In Russia money can be borrowed on the security of the capital value of the roads (up to 70 per cent. of this value) for 3.8 per cent. Further, the state will lend money without interest for periods of 10 years for the construction of certain roads. M. Meyen, however, points out that this system of loans without interest cannot be counted upon for the future and suggests that the requisite money might be borrowed from the savings banks for periods of 25 years at 3.8 per cent. interest.

In Hungary loans appear to be largely resorted to for road purposes, both by the state and by the local authorities. When a county desires to raise a loan, the County Committee passes a resolution to that effect, which has to receive the approval of three ministers—the Minister of Finance as regards its financial side, the Minister of the Interior for its bearing upon property law and the Minister of Commerce as it affects the interests of the municipal road fund. The period for such loans is usually from 30 to 50 years. Messrs. Nemethy and Keviczky are strongly in favor of the loan system, considering it generally a cheaper method and, indeed, a useful investment.

Mr. Clifford Richardson, on the contrary, expresses a strong opinion that the most economical method of financing construction work is by payment for it when completed from a general fund raised by taxation of the community, by special levy, or by special assessments immediately payable. This involves an immediate burden upon the public, but no interest or sinking fund charges are incurred, which invariably add to the final cost. He points out the extreme danger of long term bonds and gives a number of glaring instances of bonds being issued for periods extending far beyond that of the life of the work. A highway surface, he says, has only a certain life, and the life of the roads as built in America at the present time cannot be more than 10 to 15 years at the outside. He admits, however, that were foundations with proper drainage provided, and were they of a character that could be looked upon as permanent for 50 years or over, as would be the case with six or more inches of Portland cement concrete, their cost could well be paid for in long term bonds.

Conclusions*

I venture to submit for the consideration of the Congress the following conclusions:

1. The expenditure on the maintenance and improvement of:

(a) The roads which serve as main routes of communication between important places in any country; or

(b) The roads which are used mainly by long distance traffic, unless such expenditure is borne wholly out of national revenues under a system of state administration of roads (which system is practicable and suitable in the case of some roads in some countries), should be mainly paid for out of national revenues, whether or not such roads are locally administered and maintained, subject, where local administration prevails, to the supervision of a central government authority, both as to efficiency and expenditure.

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*These conclusions were changed by the sectional meetings and by the final meeting of the congress only by a slight modification of the phraseology and punctuation. The final conclusions adopted by the congress were printed in "Good Roads" for August 2, those on the 9th Question on page 53.

2. It is desirable to abolish, so far as possible, all tolls on public roads, but it is equitable that the owners of vehicles which, on account of their weight or weight combined with speed, or any other exceptional circumstances connected with either the vehicle or use of the road, cause special damage to roads beyond the wear and tear of the ordinary traffic of any district, should be subject to special taxation, the proceeds of which should be earmarked for expenditure on roads.

3. Borrowing money for new road construction and for the periodic renewal of the surface coating of a road is consistent with sound financial principles, provided that the loan period in the case of loans for renewals is kept well within the life of the surface coating.

Opportunities for Highway Engineers in the Southern States[*]

By **ROBERT J. POTTS**.[†]

Viewed in a general way, it may be said that the South is considerably behind the North, and, more particularly, the East, in both the quality and amount of road improvement. This condition may be attributed to three principal causes. The first and most important is the generally impoverished condition of the country after the Civil War, its backwardness in development since that time, and the consequent small taxable values. The second cause is the very general lack of really good materials for road building throughout a large part of the South. The third cause of our inferior roads is the lack of competent engineers to handle the work and the attendant lack of an educated public opinion which will demand first-class work in all cases.

This lack of high grade roads in the South is by no means universal. Where the wealth of the community will justify the expense, many excellent county road systems have been built. This is especially true where good material is available. For instance, few counties in America have better or more modern roads than Fulton County, Georgia, in which the city of Atlanta is situated. With an abundance of excellent rock, adequate taxable values and a large supply of convict labor, they have constructed a large mileage of macadam and asphalt macadam road that will compare favorably with the best in the country. We could mention many other notable exceptions to the general rule, which show very satisfactory progress in road improvement where local conditions will justify.

Of the states usually included by the term "southern," only Virginia, Alabama, Louisiana and Kentucky have regularly organized state highway departments.[**] North Carolina, through its Geological and Economic Survey is rendering practically the same service to the state as is given by the highway departments of the other four states. We may therefore consider that five southern states have initiated the policy of state supervision of public road building. It is hardly worth while setting out the powers and duties of these state highway departments. Suffice it to say that they are much more limited in their operations than are similar departments in the eastern states. This is caused by lack of funds, lack of legal authority, and lack of a strong public sentiment in favor of centralizing road control instead of allowing it to remain a local question as heretofore. However, a start has been made and these departments will doubtless be strengthened from time to time until they become adequate to direct all road work in their respective states. The greater number of the remaining states in the South have, through their state schools or otherwise, done at least something towards furnishing engineering advice on road work. These states will doubtless soon follow the lead of the five states mentioned above by actively taking hold of the public road problem and directing future construction.

The employment of county engineers has been relatively as much neglected as the creating of state highway departments. It is the exceptional county where an engineer is regularly employed from one year's end to the other. In the larger counties, particularly those having large towns or cities, the annual expenditures for road improvement are seldom less than $50,000, frequently two or three times that amount. The usual rule in such counties is to have a county engineer who prepares plans and supervises all work, though actual legal control of the work is still vested in the county commissioners. In the great majority of counties in Texas the regular annual income is less than $50,000, and the whole matter of road improvement in each county rests with the county judge and four commissioners, who constitute the county commissioners' court. If a bond issue for road improvement is authorized by the voters of a county or a district, an engineer is employed to plan and supervise the construction of the roads. Payment for such engineering service is made either as a percentage fee based on the cost of the work or by a stipulated salary.

The solution of the road problem of the south and its successful execution can, therefore, be said to lie more largely in the future than that of any other section of the country. Herein lies the opportunity of the highway engineer in the South. In a productive county, high grade roads are a necessity; and that same productiveness which makes roads necessary, gives ample assurance of the ability to pay for them. This is the situation in the South today.

The general improvement of the country is pushing the road question to the front. Southern counties in large numbers are issuing bonds for good roads every month. It is very important that the taxpayers get a dollar's worth of road for each dollar expended. Roads must be built so well that they will give service, and at the same time not be prohibitive in cost. In many sections of the South the engineer is at once confronted with the fact that he must build a road of material that would be quickly rejected under the standard specifications of other states. It therefore becomes necessary to so adapt his materials, and so regulate the character of workmanship and the consequent cost of the road that its serviceableness will be commensurate with its cost.

Much progress has already been made in the coastal region of the southern states and in the Mississippi Valley towards adapting local materials to road construction, but much more remains to be done. There is opportunity for every engineering college in the South to render valuable service to its state by a study of these problems. There is still greater opportunity for every practicing highway engineer in the South to thus aid in the development of his country and thereby put his own future success beyond all serious question.

A Bond Issue of $500,000 for highway improvement will be submitted to the voters of Jefferson County, Tex., at the coming election, in response to a petition submitted to the Board of County Commissioners. If the issue carries a system of main trunk roads will be constructed at once in the county, other roads to follow as needed. A similar bond proposition was defeated at the election last March.

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[*] Paper presented at the 21st annual meeting of the Society for the Promotion of Engineering Education, Minneapolis, Minn.

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[**] West Virginia has been added to this list since the preparation of Professor Potts' paper.—Ed.

Street Work in New York City During 1912

The annual report of Chief Engineer Nelson P. Lewis of the Board of Estimate and Apportionment of the City of New York, which is noted briefly elsewhere in this issue, contains much of interest to highway engineers everywhere. A large part of the report is devoted to matters pertaining to paving and other street work, the discussion of financing being particularly valuable.

One of the first matters taken up by Mr. Lewis is the city plan. While the plan in accordance with which the city has developed is unsuitable in many ways and has defects which should be avoided in planning the development of newer parts of the city, it is being more fully realized each year, according to Mr. Lewis, that the city plan is the fundamental requirement for the orderly growth and economical development of the city. While it cannot be said that any real, comprehensive planning has yet been done, Mr. Lewis holds that substantial, though slow, progress is being made. The city of New York has never prepared or issued an official map except one large map which was prepared for the Paris Exposition of 1900. This plan, though a fine example of drafting, was little more than a picture indicating the existing street system in the built-up portions of the city and a possible system of streets, boulevards and parks. At present, however, work is being done on a very different plan. The method of preparing this was decided upon after discussions with the consulting engineers of the several boroughs. The information is supplied by the topographical bureaus of the different boroughs, the sheeets being made on a scale of 600 ft. to the inch. These sheets will be assembled, and, in most cases, redrawn, in the office of the Chief Engineer of the Board of Estimate and Apportionment, the sections being arranged so as to permit the issuing of separate maps, each showing, as nearly as possible, one borough.

In referring to city planning in its broader sense, including not only the design of street, park and drainage systems but the location and design of public buildings, the creation of civic centers and the many other matters embraced in such an undertaking, Mr. Lewis calls attention to the danger of losing sight of the fundamental ideas involved while attending to matters of detail. As an example of this he cites the criticism which has been made of the plan proposed for the city of Seattle. This, according to Mr. Lewis, although it has been subjected to very strong adverse criticism, is good as regards the fundamental features for the control and stimulation of the growth of the city. The criticism has been directed towards details which are of minor importance.

In this connection, Mr. Lewis also calls attention to the need for an official body, which shall take into account the effects upon the city as a whole, to pass upon plans of a local nature. Several instances are given in which such plans have been prepared, but have not been carried out for one reason or another, or upon which work has been commenced, although the improvement in question is manifestly ill-planned.

In discussing the city's paving policy Mr. Lewis points out that the question of financing highway improvements, both rural and urban, has received much consideration during the past year and refers especially to the paper on this subject presented by Clifford Richardson at the Cincinnati convention of the American Road Builders' Association last December. The policy pursued by the state of New York in financing its road improvement, which in many ways resembles that heretofore followed by the city of New York, is cited by Mr. Lewis as an illustration. He calls attention, first, to the authorizing of an issue of 50-year bonds to the amount of $50,000,000. Some of the work in connection with the state's highway improvements, such as the purchase of land, grading and the construction of steel and masonry bridges and culverts, may be considered permanent, according to Mr. Lewis, and for such portion of the work it may be proper to pay with money borrowed for 50 years. For the less permanent work, however, the term of the bond should correspond with the estimated life of the improvement. The roads built, he says, are costing from $12,000 to $20,000 a mile and some of them more. "Interest and sinking fund payments for 50 years," he says, "together with the cost of maintenance and periodical surface renewals will, before the roads are fully paid for, reach a total equivalent of from $165 an acre in the case of $12,000 roads to nearly $200 an acre in the case of $20,000 roads, for each acre of land within a half mile on each side of the road. When one considers the actual value of the farm lands through which these roads are built, the cost under the present method seems absurdly high."

The folly of such a course in financing city improvements is beginning to be realized, according to Mr. Lewis, repaving bonds lately issued by the city being for a term of ten years only, which will be within the average life of the pavements. The method of financing repaving work is set forth clearly in the report. As the section of the charter relating to this matter stands at present, the Board of Estimate and Apportionment is authorized to classify pavements as permanent and preliminary, and no street which has been paved with a permanent pavement paid for by assessment can be repaved at the expense of the abutting property owners without a majority petition. When, however, a street which has been paved with a preliminary pavement is repaved, the difference between the cost of the permanent pavement and the preliminary pavement is assessed. It is also provided that regardless of the classification by the Board of Estimate and Apportionment "pavements which were laid or authorized between Jan. 1, 1898, and June 20, 1910, the cost of which was assessed upon the property deemed to be benefited, and pavements the cost of which was paid for by assessment or by the owners of adjoining property or by local taxation or by bond issues paid by the locality prior to Jan. 1, 1898, shall be deemed to be permanent pavements." In accordance with the law, the Board of Estimate and Apportionment in June of last year adopted a resolution classifying pavements as follows:

"Permanent Pavements.—The following pavements laid on a Portland cement concrete foundation, 6 ins. or more in thickness: Stone block, wood block, asphalt block not less than 3 ins. in thickness, sheet asphalt with wearing surface not less than 2 ins. in thickness and binder not less than 1 in. thick, vitrified brick and iron slag.

"Preliminary Pavements.—Stone block on sand foundation, asphalt block not less than 2 ins. in thickness laid on a concrete foundation not less than 4 ins. thick, sheet asphalt laid on a concrete foundation not less than 4 ins. thick, bituminous concrete and bituminous macadam."

From the adoption of the resolution until the close of the year 1912, pavements authorized by the board in the Borough of Manhattan embraced 18,220 sq. yds., all of which consisted of permanent pavements. In the Borough of Queens the authorizations were for 32,350 sq. yds. of permanent pavement. In the Borough of Brooklyn, 245,884 sq. yds. of sheet asphalt pavement were authorized, 68 per cent. of the total being classed as preliminary and 32 per cent. as permanent. In the same borough, 14,043 sq. yds.

of stone pavement were authorized, 74 per cent. being preliminary and 26 per cent. permanent. In the Borough of the Bronx the authorizations were for 7,604 sq. yds. of permanent asphalt pavement; 69,830 sq. yds. of asphalt block pavement, of which 7 per cent. was preliminary and 93 per cent. permanent, and 14,410 sq. yds. of stone block pavement, of which 94 per cent. was preliminary and 6 per cent. was permanent. In the Borough of Richmond no pavements were authorized.

In commenting upon these figures Mr. Lewis says that in Manhattan and Queens an effort seems to have been made to lay the pavements in a substantial manner, and in the Bronx the object of the resolution seems to have been attained in that all of the sheet asphalt and 93 per cent. of the asphalt block put down were of a permanent character, while 94 per cent. of the stone block was of the nature classed as preliminary. When it becomes necessary to replace the preliminary stone block pavement with a permanent pavement of the same kind the entire cost of the concrete foundation and the additional cost of the better quality of blocks which will probably be used can be assessed on abutting property.

In the Borough of Brooklyn, according to the report, the real object of the resolution seems to have been defeated, since of the entire amount of sheet asphalt pavement authorized more than two-thirds was preliminary pavement, that is, it was laid on a concrete foundation less than 6 ins. thick. The policy with regard to stone block pavements in Brooklyn he characterizes as wise and similar to that followed in the Borough of the Bronx. He calls attention to the fact that when it becomes necessary to replace the preliminary sheet asphalt pavements other preliminary pavements can be laid and the cost may be wholly assessed, but that there will probably be a demand for permanent pavements, in which case the city, assuming that the prices are about the same as those prevailing when the first pavements were laid, can assess only the cost of increasing the foundation to 6 ins. by laying 2 ins. on top of the old concrete, if it still remains, or, if a new foundation has to be provided, can assess only that portion of the cost corresponding to the additional thickness. He states that the only way to prevent a continuance of this policy appears to be to refuse to authorize preliminary pavements to the extent to which they seem to be desired in the Borough of Brooklyn.

It is worthy of note, according to Mr. Lewis, that although no pavement has been authorized in the Borough of Richmond during the past year, the borough receives an allowance of $300,000 annually for repaving streets which it is to be presumed were once paved at local expense. The funds provided for repaving, it is stated, have been used not only to substitute modern and expensive pavements for cheap and short-lived ones, but also to extend pavements over areas not previously paved at the expense of the owners of abutting property. "Certain roads," it is stated, "have been improved by long strips of macadam or some more substantial pavement to a width of 14 ft. to 18 ft. A repaving at public expense has provided a modern street surface on a concrete foundation for the full roadway width corresponding with the width of the street, which may be 30, 35, 40 or even 50 ft. In many cases roadways already paved have been widened by setting back the curb, and the area added has been 'repaved' at public expense where no pavement had ever been laid by local assessment. This has been done under the theory that the added portion of the roadway was formerly the sidewalk, which had been improved with stone flagging or concrete, and that the word 'pavement' included curbing and sidewalk flagging. While the reflagging or other improvement of sidewalks for their full width has until quite recently been deemed to be assessable work and appears to be so classed in Sections 428 and 435 of the Charter, it has lately been called 'repaving' and has been paid for from the repaving bond fund without local assessment. The reason advanced in justification of this policy has been the prohibition against assessing the cost of repaving contained in Section 948 of the Charter, but this section has been amended as already described. The Board of Estimate and Apportionment is now authorized to classify pavements, and it has done so. It has not defined sidewalk flagging or curbing as either preliminary or permanent pavement. It has not said that a strip of pavement, whether short-lived or substantial, covering a half or a third of the width of a street roadway is a complete pavement. The excuse for the use of so large a part of the repaving fund for work which can properly be assessed appears no longer to exist. When a pavement is laid under an assessment proceeding, the resetting or replacement of curbing is an incident to such paving, and should be paid for as a part thereof. In case of a repavement at public expense, the resetting or replacement of curbing is a necessary incidental part of such repavement, and should be paid for as a part thereof."

Reference is also made in Mr. Lewis' report to the improvement of the highways in the Borough of Queens by the plan under which the city paid 85 per cent. of the expense and the remaining 15 per cent. was paid by borough assessment. This work, as pointed out in the report, was described by G. Howland Leavitt, Superintendent of Highways of the Borough of Queens, at the convention of the American Road Builders' Association in Cincinnati last December. ["The Laying of One Hundred and Two Miles of Smooth Road Surface in One Borough in Five Months," by G. Howland Leavitt, "Good Roads," Feb. 1, 1913, page 110.] When the authorization of this work was under discussion by the city authorities Mr. Lewis pointed out the desirability of fixing the location and dimensions of these highways and acquiring title to them for their full width before making improvements "which would satisfy all present needs and which would make the property owners along these roads not only indifferent but positively hostile to any improvement which would involve expense to them." It was recommended that the work be authorized only after the Borough President had prepared such plans, the board had adopted them and proceedings had been instituted for acquiring title. This, according to the report, was not done, the improvements being authorized with the understanding that it would be done as soon as practicable. The roads have been improved, the abutting property owners have secured, without expense, roads which will be adequate for some years to come, and in not a single instance has a plan been submitted and a title proceeding authorized, and there is no immediate prospect of this being done. Mr. Lewis points out that in this way an opportunity has been lost to control the future development of the territory along more rational lines and with streets of an adequate width for future needs.

The discussion of the repaving policy of the city is concluded by three tabular statements showing, for each of the five boroughs, the area, population and the number of square yards of pavement; the number of miles of different kinds of pavement, and the funds provided for pavements, pavement renewals and maintenance during 1912. These tables are reproduced herewith.

The removal of encroachments is reviewed briefly in the report. This work proceeded during the year in the Borough of Manhattan, ordinances being adopted covering portions of Allen, Beaver, Beekman, Cedar, Pine, Rivington, Wall, 8th, 14th, 28th, 34th and 125th Sts.; 5th and 6th Aves.; Exchange Place; Union Square East, and the intersection of Broadway and 6th Ave. Mr. Lewis states that when the removal of encroachments was first proposed it was predicted that it would result in an unpleasant monotony in the appearance of the city's streets. It is now generally conceded that where encroachments have been removed the streets have been greatly improved in appearance and public convenience has been promoted to an incalculable extent.

In grade crossing elimination the principal progress, as in 1911, was made along the lines of the Long Island Railroad in the Borough of Queens. This, as is the case with all of the other matters mentioned in Mr. Lewis' report, is taken up in detail in the report of Deputy Chief Engineer Tuttle.

AREA, POPULATION AND NUMBER OF MILES OF PAVEMENT IN EACH OF THE BOROUGHS OF NEW YORK CITY.

Borough.	Area, sq. miles.	Population.	Miles of pavement.	Area of pavement sq.yds.
Manhattan	21.9	2,462,703	443.83	9,305,414
Brooklyn	70.8	1,810,836	775.54	15,404,980
The Bronx	41.4	556,975	161.60	3,717,767
Queens	117.3	346,858	447.17	5,786,446
Richmond	57.2	94,257	227.03	2,609,115
Total	308.6	5,271,629	2,055.17	36,823,722

MILES OF PAVEMENTS OF DIFFERENT KINDS IN EACH OF THE BOROUGHS OF NEW YORK CITY.

Borough.	Asphalt and asphalt block.	Stone block.	Brick and slag.	Wood block.	Concrete.	Macadam.
Manhattan	300.31	113.54	....	25.17	....	4.81
Brooklyn	498.12	163.00	4.62	6.63	....	103.17
The Bronx	106.38	42.14	2.04	4.36	....	6.68
Queens	40.59	37.76	12.86	6.17	0.44	349.35
Richmond	9.96	5.89	6.69	3.12	0.38	200.99
Total	[1]955.36	[2]362.33	[3]26.21	45.45	0.82	[4]665.00

[1] Of this amount 783.52 miles are sheet asphalt, and 171.8 miles are asphalt block.

[2] 312 miles are granite, 36.67 miles trap, 8.04 sandstone and 5.62 miles cobblestone.

[3] 19.26 miles vitrified brick, and 6.95 miles iron slag blocks.

[4] Macadam is almost entirely confined to suburban districts, and is usually laid at a width of 18 ft.

The quantities given above do not include park roads and boulevards under the control of the Park Department.

FUNDS FOR PAVING WORK IN EACH OF THE BOROUGHS OF NEW YORK CITY DURING 1912.

Borough.	New pavements including curbing,etc.	Renewals.	Maintenance.	Total.
Manhattan	$172,600	$3,500,000	$953,417	$4,626,017
Brooklyn	1,456,100	1,750,000	971,690	4,177,790
The Bronx	1,242,900	350,400	607,684	2,200,984
Queens	1,844,220	350,000	798,681	2,992,901
Richmond	21,300	300,000	282,585	603,885
Total	$4,737,120	$6,250,400	$2,614,057	$14,601,577

In discussing assessments for street openings, Mr. Lewis states that the great cost of acquiring titles to streets has continued to be a subject of complaint and that no form of public improvement appears to involve a greater burden of expense in proportion to the benefits derived. This, it is explained, is the result of the methods prescribed by law, "which are calculated to increase the incidental expenses by excessive demands for awards for property taken on the basis of city lots, although without the conversion of the area to be acquired into public streets the abutting property would be unavailable for use as city lots, and also to the inability of the city to take all of the parcels which are badly mutilated by the laying out of the new street." At present, when the Board of Estimate and Apportionment authorizes a proceeding for acquiring title, the cost of which is to be borne by assessment, it is authorized and required to fix the area of benefit. In doing so, every effort has been made to follow a consistent policy, and the report states that it is gratifying that in so few cases has it been necessary to amend the limits of these areas. The practicability of adopting a definite policy in the distribution of expense has been under discussion during the past year, it is stated, and reference is made to the paper suggesting a certain apportionment of expense presented by Mr. Lewis at a meeting in Boston in May, 1912. ["How City Planning Bills Are to Be Paid," by Nelson P. Lewis, "Good Roads," July 6, 1912, page 16.] The general plan suggested in this paper was that under normal conditions the entire cost of acquiring streets 60 ft. or less in width should be assessed upon the immediate frontage, and that for wider streets the frontage assessment should be the proportion of the total cost represented by the ratio of 60 ft. plus one-fourth of the excess over that width to the total width of the street, the frontage assessment, however, to be limited to the equivalent of a total width of 80 ft. Under this plan the expense not imposed upon the frontage would be placed upon a larger area and a portion upon a borough, and even upon the city at large in the case of streets of exceptional width. It is pointed out by Mr. Lewis that in some cases building damages will be so large as to make a rule of this kind unfair, and states that in such cases and also in the widening of existing streets it has been suggested that where the building damage exceeds a certain percentage of the land damage—say, 20 per cent.—this percentage be added to the actual width of the street and the apportionment of expense be made on the basis of such equated width. Continuing, he says that the problem is exceedingly difficult of solution in any precise form, that if a definite rule were to be adopted it would probably be found unsuited to special cases, and suggests that if a rule were to be adopted it should be with the understanding that it was an expression of a general policy which it would be necessary to modify to suit special cases.

Mr. Lewis also calls attention to the fact that in the paper referred to emphasis was placed upon the important principle that where there is a special benefit there should be a special assessment. This, though it is becoming quite generally recognized, is still generally disregarded in practice. He holds that it would apply not only to the acquisition and improvement of streets but to all other improvements, such as the acquisition of parks, sites for important public buildings, the location of civic centers, and even to the building of municipal rapid transit lines and the creation of new waterfront facilities. He points out that these all inevitably enhance realty values in the vicinity and states that it seems unfair that property so increased in value should bear no greater proportion of the burden than property situated in distant parts of the city, which receives no direct or special benefit.

Financial Problems in Highway Engineering

That the financial problems of highway engineering should be made the subject of a course in economics in engineering colleges was argued in one of the papers presented at the twenty-first annual meeting of the Society for the Promotion of Engineering Education. The paper, entitled "Financial Problems in Highway Engineering an Essential Part of Courses in Economics," was presented by George R. Chatburn, Head Professor of Applied Mechanics at the University of Nebraska, Lincoln, Neb.

The different subjects in a well planned curriculum, according to Professor Chatburn, are connected and interdependent in some such way as are the individual cells in a honeycomb. The problems peculiar to engineering justly receive the most attention in engineering schools, but they form merely the central cell about which others cluster. These problems merge into the special problems of the lawyer, the accountant, the business manager, the chemist, the physicist, the geologist, the bacteriologist, the rhetorician, the historian, the sociologist and the economist, so that, according to the saying quoted by Professor Chatburn, "to know every thing about something it is necessary to know something about every thing."

Perhaps the most important problem connected with highways, in Professor Chatburn's opinion, is the cost of primary transportation. For years, he says, secondary transportation —that on railways, canals, lakes and oceans—has received the attention of economists as well as of lawyers, scientists and engineers, and, being almost entirely a matter of private enterprise, its cost has resolved itself into a question of the economic and profitable adjustment of rates and fares and the many elements entering into them. On the other hand, what little study has been made of primary transportation has been by engineers, though the question covers a wide field. Among the matters listed as properly embraced in it are economic location, methods of construction, traffic census, effect of grades, kinds of road surfaces, kinds of motive power, durability, maintenance, effect upon neighboring industries, sanitary qualities, the effects of noise and of pleasant and unpleasant traveling and the sociological aspects of road improvement.

These matters, according to the paper, if dealt with at all in engineering colleges, are handled as purely engineering subjects; but they might well be considered and made more prominent in the departments of economics, sociology, bacteriology and psychology. Professor Chatburn holds that the cost of primary transportation is so hidden that if thought of at all it is regarded merely as an incident of the cost of production, while if it were segregated and discussed as a problem in marketing, the principles of accounting applied and each operation debited with its share of the cost of production, the economic features would be seen to be of as much importance as those of rates and fares in secondary transportation.

New phases of the problem will come up, it is predicted, as motor trucks become more generally used. In this connection it is pointed out that already over 40,000 automobiles are owned in Nebraska alone and that in time the grain may be hauled to the railroads by tractors.

A considerable portion of Professor Chatburn's paper is devoted to the statement of problems of highway engineering that fall within the province of the economist. All of these are primarily questions of financing road work, which involves the economic principles relating to productive capital, the rent and capitalization of land, the wages of labor employed in road construction and maintenance and the financing of enterprises. The economics of long term bonds should be explained to those who have the vote, Professor Chatburn holds, and highway officials and engineers should be prepared to make the explanation. Included also in the broad question of financing is the matter of a just and equitable system of highway taxation embracing the questions of tolls, vehicle licenses, other special taxes, the methods of determining benefits and whether or not the same methods should be employed for maintenance as for construction.

Another phase of the problem which, according to the paper, should be considered by the economist is the guaranteeing of work for a term of years.

State and national aid are noted by Professor Chatburn as matters for consideraeion from the standpoint of economics. Whether the development of internal primary transportation facilities should be aided by the nation or left entirely to local units; whether or not one kind of transportation should receive national aid and others not receive such aid; whether the production of capital through highway improvement by the national government will be distributed among the people with sufficient equity to warrant paying for the work by general taxation, and if it would be advisable to have trunk lines used largely by automobilists constructed by private enterprises and allow the collection of tolls, are among the questions suggested for consideration.

Besides these questions of public policy there are matters in the science of economics that, according to the paper, are of import to the highway engineer as an individual. It is argued that since the highway engineer is a constructor he is a producer and as such would be better equipped if he understood the principles of economics treating of production and the underlying factors of land, labor and capital.

An Illinois Concrete Road

A cement concrete pavement about a mile in length has recently been laid on what is known as the La Salle-Oglesby Road in Illinois. The pavement extends from the southern limits of the city of La Salle in a general southerly direction across the Illinois River bottom to the Shippingsport Bridge. The accompanying illustrations show the construction work in progress and the finished road.

The pavement was built of 1:2:3½ concrete, 7 ins. thick at the center and 6 ins. at the edge. The concrete was mixed in a Koehring mixer and laid in one course. The aggregate

WORK OF CONSTRUCTION ON THE LA SALLE-OGLESBY ROAD IN ILLINOIS—CONCRETE MIXER IN BACKGROUND.

PARTLY COMPLETED PAVEMENT—BAKER EXPANSION JOINT IN PLACE.

METHOD OF PROTECTING PAVEMENT WITH EARTH AND CANVAS COVER.

for the concrete consisted of washed crushed gravel ranging in size from ¼ to 1 in. and clean torpedo sand graded down from ¼ in. The cement used was "Chicago AA" and "Marquette," the former on the northerly portion of the road and the latter on the southerly portion. The cement was donated by the Chicago Portland Cement Co. and the Marquette Cement Mfg. Co and the gravel by the American Sand & Gravel Co. There were used in the construction of the road approximately 1,884 cu. yds. of gravel, 1,070 cu. yds. of sand and 3,814 bbls. of Portland cement.

At intervals of 50 ft. Baker expansion joints were placed in the pavement at an angle of 60° with the center line. No reinforcement was used in the pavement.

The pavement replaces a worn out macadam roadway that was found inadequate for the heavy automobile traffic it was called upon to carry. Before the reconstruction of the road it was estimated that the cost of putting the old macadam into good condition would be about one-sixth of the total cost of putting down the concrete pavement.

The first batch of concrete was placed on July 7, and the road was formally opened on Aug. 21. The opening was made the occasion of a celebration, including a barbecue furnished by the citizens of La Salle. Several thousand people from the vicinity of the road attended the opening, and addresses were made by State Highway Engineer A. N. Johnson, Lieutenant Governor O'Hara, Chairman A. D. Gash of the Illinois State Highway Commission, E. C. Ferguson of the Chicago Chamber of Commerce and Norman D. Fraser, President of the Chicago Portland Cement Company.

Plans for Street Improvement in Chicago, Ill., prepared jointly by Lawrence McGann, Commissioner of Public Works, and a committee of the Associated Roads Organization of Chicago and Cook County, have been approved by Mayor Carter Harrison. These plans contemplate the connection of the streets in the downtown section with the county and state roads, providing direct routes to the outlying districts. What is known as the "mayor's fund," comprising 15 per cent. of the wheel tax receipts, will be used in paying for the improvement.

COMPLETED ONE-COURSE PORTLAND CEMENT CONCRETE PAVEMENT, LA SALLE-OGLESBY ROAD IN ILLINOIS.

Alabama State Highway Work

As noted on another page, there has recently been issued a report on the operations of the State Highway Commission of Alabama during the fiscal year from March 1, 1912, to March 1, 1913. The report, dated July 16, 1913, was made to Governor Emmett O'Neal by the State Highway Commission, consisting of Robert E. Spragins, Chairman, and G. N. Mitcham, Eugene A. Smith, V. B. Atkins and John Craft, Associate Commissioners, and by the State Highway Engineer and Secretary W. S. Keller.

State aid in Alabama is furnished by appropriations from the state highway fund to the various counties upon application from the county authorities. Each county is entitled to aid to the extent of $2,000 per year provided it appropriates an equal amount. If the condition of the treasury warrants it, this amount may be increased to $4,000. The county authority, a commissioners' court or board of revenue, designates the section of road to be improved, but this section must be upon a main traveled thoroughfare and its improvement must consist of work of a permanent nature and must be approved by the State Highway Engineer or his assistant. Each year's appropriation must be used on a continuous section of road, though a different road may be selected for each year's work, or, if two years' appropriations are being used, one-half may be used on one road and one on another.

AN ALABAMA STATE AID ROAD IN GENEVA COUNTY—SURFACE OF SAND-CLAY CONSTRUCTION.

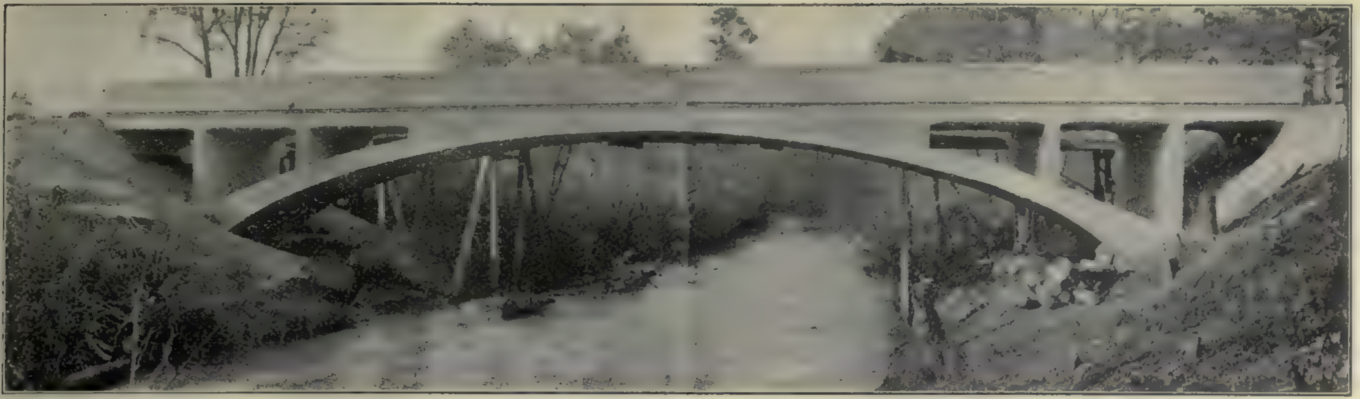
AN ALABAMA STATE AID ROAD IN LEE COUNTY—SURFACE OF "TOP SOIL" CONSTRUCTION.

In extending state aid the commission does not obligate itself to build any specified length of road. Work is begun at the point designated and carried as far as funds permit.

During the year covered by the report, $120,000 was paid to the counties out of the state highway fund. Of this total, $44,000 was paid in amounts of $2,000 each to the twenty-two following counties: Autauga, Bibb, Blount, Bullock, Calhoun, Chilton, Colbert, Coosa, Covington, Cullman, Etowah, Geneva, Hale, Houston, Jackson, Jefferson, Lamar, Macon, Madison, Perry, Pickens and St. Clair. The remaining $76,000 was paid to nineteen counties, each of which received $4,000. These counties were: Butler, Chambers, Coffee, Dallas, Elmore, Escambia, Franklin, Lee, Limestone, Marion, Montgomery, Morgan, Randolph, Russell, Shelby, Sumter, Talladega, Tallapoosa and Walker. There are 68 counties in the state. Besides these appropriations, the sum of $9,701.46 was expended by the State Highway Department as follows: Salaries, $7,275; traveling expenses, $1,664.76; miscellaneous supplies, $761.70.

Surveys for state aid work are made by the resident engineers of the commission, who in some cases are also county engineers. The right of way of all state aid roads is fixed by the commission at not less than 50 ft. It must be acquired by the county either by donation by the owners of the land through which the road passes, by agreement between the owners and the proper county authorities or by condemnation—without expense to the state and exclusive of the $2,000 appropriation made by the county. It must be secured before any contract is let or construction work commenced. The width of the traveled way is fixed at not less than 20 ft. between ditches and the width of the shoulders at not less than 4 ft. each. The surfaced portion of macadam roads must be not less than 10 ft. wide; of gravel roads not less than 12 ft., and of sand-clay not less than 14 ft. The best material available near the work is used for surfacing and is placed to a depth varying in accordance with its quality. Both the material and the depth to which it is laid must be approved by the State Highway Engineer or his assistant. The maximum grade for state aid roads is 5 per cent. Plans and specifications for work are prepared by the State Highway Engineer or by a county engineer, but in the latter case must be submitted to the state officials for approval or disapproval.

Work may be done by contract or otherwise, as may be decided by the commissioners' court or board of revenue of the county in which the work is done. If the work is done by contract, bids must be advertised for in a Montgomery paper and in a local paper for 30 days before the reception of bids, and copies of the plans and specifications for the information of contractors must be on file with the probate judge of the county and in the office of the commissioners. The bids are opened in the presence of the State Highway Engineer or his assistant and must be passed upon by him before contracts are awarded. All contracts are awarded subject to approval or rejection by the commission at its first regular meeting after their letting.



REINFORCED CONCRETE ARCH BRIDGE OVER LITTLE UCHEE CREEK, RUSSELL COUNTY, ALABAMA—SPAN 90 FT.—REPLACES OLD WOODEN BRIDGE, PART OF WHICH CAN BE SEEN BACK OF NEW STRUCTURE.

In case the work is done by county forces either one of two methods may be employed. By the first, all labor is paid for at the prevailing price of labor in the section in which the work is being done, a reasonable amount per day is allowed for teams and drivers of the county or for hired teams, and no supplies are paid for and no labor or teams maintained. By the other method all labor is paid for at the rate paid by the county, and the teams are maintained, no daily allowance, however, being made for teams. When convicts are used for the work, both men and teams are maintained and the salaries of foremen and guards are paid for out of the joint funds of the state and county.

During the period covered by the report 97.56 miles of state aid road were completed and 49.72 miles were contracted for but had not been finished at the close of the year. The following table shows the number of miles of various kinds of road completed during the year and the number of miles contracted for but not completed.

	Number of miles.	
Kind of road.	Completed.	Contracted for
Graded earth	42.24	9.50
Sand-clay (top soil)	24.82	16.54
Gravel	16.88	9.95
Chert	9.07	13.73
Macadam	4.55	....
Totals	97.56	49.72

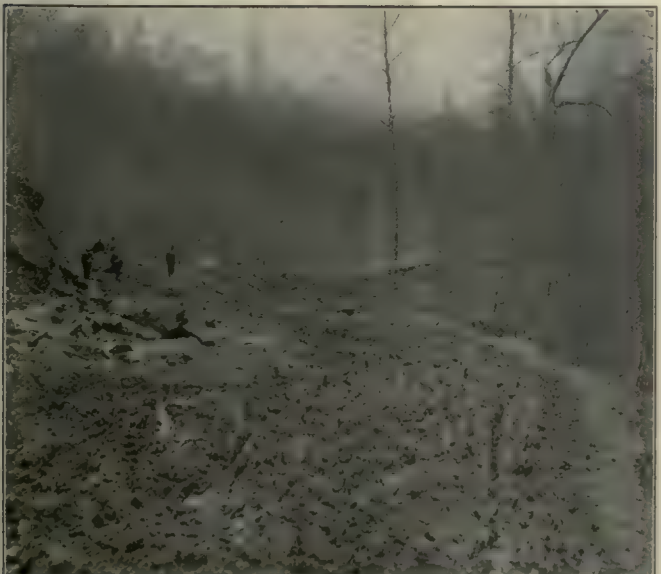
The number of lineal feet of state aid bridges completed during the period and the number of feet contracted for but not completed at the close of the year are shown in the following table:

	Lineal feet	
Kind of bridge.	Completed.	Contracted for but not completed.
Concrete	306.5	192.0
Steel	200.0	1,920.0
Concrete and wood	140.0	....
Totals	646.5	2,112.0

In addition to the data on state aid work there are included in the report statistics of road work throughout the state during 1912. The data were secured from probate judges and county treasurers in practically all of the counties of the state. It is stated in the report that so few of the counties keep a separate account for the construction of new roads and for maintenance that it is impossible to separate the two, and that while no accurate account is kept of the mileage of roads constructed the reports for 1912 are very nearly correct. The number of miles of road improved by the counties during 1912 is shown in the following table:

Kind of road.	No. of miles.
Macadam	33.25
Gravel	194.00
Chert	45.00
Sand-clay	208.00
Graded earth	274.00
Total	754.25

Reports from the counties on the road and bridge expenditures for 1912 and the amounts available for 1913 show that in 1912 $1,353,750 was expended on roads and $290,344 on bridges. For 1913 there was available for roads $1,534,424 and for bridges $333,176.



HEAVY GRADING ON THE ONEONTA-CLEVELAND ROAD, BLOUNT COUNTY, ALA.

ONEONTA-CLEVELAND STATE AID ROAD, BLOUNT COUNTY, AFTER COMPLETION.

The Meaning of "Macadam"

By MAJOR W. W. CROSBY.*

General agreement as to the meaning of the word "macadam"—commonly used to refer to a type of road surfacing—would prove of great convenience. The writer does not know that there is at present much diversity of opinion as to what is covered by the term, but it has been stated to him that no general agreement has been reached on this point; that in more or less numerous cases where experience has been limited to the use in construction of, say, a few kinds of broken stone, it seemed that little, if any, thought had been given to arriving at the limits of meaning of the term "macadam," it being granted that it applied to the work in hand; and that accordingly it might be wise to discuss the possibilities of its definition and to suggest one such as a concrete starting point for the discussion.

Any definition of "macadam," meaning a type of road surfacing, which limits the material to be used for its construction to crushed stone would, the writer thinks, be too narrow to be either correct or convenient. McAdam, the engineer from whose name the term is derived, himself used no "crushed" stone nor did he confine himself even to broken stone. He specifically refers, in his "Remarks On Road Making" (London, 1820) to the use of "gravel," "flint," "limestone," "whinstone" and "large pebbles mixed with sand," and says: "Excellent roads may be made with any of these materials." Then he later lays down certain principles for the use of "different materials," condensed extracts from which are quoted below in the order he gives them:

> The size of the largest pieces of road metal should not "exceed an inch in any of its dimensions."
>
> The road (i. e. road crust) ought to be considered as an artificial flooring or roof over the foundation, which latter really carries the bonds and to that end, must be kept dry.
>
> The admixture of earthy or other fine material to broken stone is injurious and a mechanical bond or interlocking of angular pieces of road metal is necessary. This should not be discouraged or interfered with by the presence of fine material.
>
> The road metal should preferably rest on a firm, but resilient, foundation, rather than on a hard rigid one such as ledge or rock paving.
>
> The thickness of the road metal should be no greater than necessary to preserve its integrity as a roof to keep the foundation dry.

Throughout the whole book may be found many references to the use of gravel by McAdam, his criticisms of it as well as of various stones, and his suggestions for the use of each.

The point the writer wishes to make is that our term "macadam," considering its derivation, means the attainment of certain results based on the observance of definite principles rather than the use of particular materials or methods.

McAdam had no steam rollers, no stone crushers, and the available materials for his road metal were limited to stone and gravel. Had good slag, for instance, been as available then as today, is it reasonable to suppose that so practical a man would have ignored its possibilities?

It seems to the writer that if we recognize the principles of McAdam, referred to briefly above, and also the wider resources for both materials and machinery now open, a proper definition of our term may be made as follows:

> Macadam is a road crust composed of gravel, shells, slag, broken stone, or similar materials, in which the largest particles do not exceed a certain maximum size (dependent in any case, to some extent on the quality of the material used but generally about two inches for the longest dimension), whose particles, having a size preventing their passing a ¾-in. ring, are compacted together so as to be interlocked and mechanically bound together to the utmost possible extent, and whose then remaining voids or interstices are filled, by the aid of water, with smaller particles and fine material from the same or similar sources. True macadam has no particles in the surface exposed to travel whose size is so great as to render them unstable under horse-drawn vehicular travel. Macadam built on top of an artificial foundation of paving is usually called "Telford" or "Telford Macadam."

If the foregoing is in itself not convincing, the writer will refer those interested to an article by him on "Macadam Construction" printed in the "Good Roads Magazine" for June, 1908, page 186, etc., for further extended argument.

In case a general acceptance of such a definition is had for "macadam," several related or subsidiary terms may be most conveniently used with an increase of clearness in their use.

For instance, "shell road" may be used to designate a road surfaced with dredged shells which are generally mixed with sand, silt, etc., while "shell macadam" would differentiate the surfacing built with clean shells, compacted and then filled (as to its voids) with only the necessary amount of sand or fine material. "Gravel road" would mean a road with a crust of unscreened or "bank" gravel, while "gravel macadam" would indicate the adherence to the principles of McAdam. A "slag road" would be built of slag from the pile, unscreened. "Slag macadam" would indicate that breaking and screening the material had taken place in some way. Further along this line, the term "bituminous gravel (or shell or slag or broken stone) macadam" would then logically be a most convenient term for differentiating such a surfacing built by the penetration method from one built by the mixing method (a "bituminous concrete.")

It seems to the writer that it is up to highway engineers to adopt promptly such reasonable momenclature in their work as will indicate by its saving of breath and ink their appreciation of the engineering demands, as well as those of the times, for efficiency.

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Action of the Automobile Upon the Road Surface

Since the automobile became a factor to be considered in road construction and maintenance, its effect upon the road surface has been a matter of interest to engineers. Considerable has been written regarding the action of the automobile tire upon the road, and so much of this has been obviously incorrect that a portion of one of the recent bulletins of the U. S. Office of Public Roads is worth noting.

The bulletin, the title of which is "Repair and Maintenance of Highways," is by Laurence I. Hewes, Ph. D., Chief of Economics and Maintenance of the Office of Public Roads, and in the early part of the work the action of automobiles upon road surfaces is set forth as follows:

> During the years from 1906 to 1913 there has been a great increase of automobile travel upon first-class country roads. It is now demonstrated beyond doubt that an ordinary water bound macadam can not successfully withstand the action of a considerable amount of automobile traffic. A macadam surface is dependent upon the preservation of its bond. The binding of the road stones is partly due to the keyed position of the stone after rolling and partly due to the presence of the "fines" or stone screenings which completely fill the voids and by their cementing action render this road crust in a sense monolithic. This cementing quality of road stone screenings varies with the stone and reaches its maximum when wet. Under the wear of iron-tired vehicles drawn by horses there is a constant abrasion of road stones which renews the binding material in sufficient amount to maintain an effective bond. The motion of a horse-drawn vehicle, moreover, produces only sufficient shearing force under the tread of the wheel to allow rolling to take place; so that even with heavily loaded vehicles, owing to the small axle friction, the tangential shearing force upon the roads is not immediately destructive. The effort necessary for traction of the horse-drawn vehicle is dependent upon the application of the horse's hoof to the road. The horseshoe, therefore, causes some displacement of the road surface. The shearing force caused by the horseshoe is seldom sufficient, however, to disturb a well bonded road to a harmful extent.
>
> The harmful action of automobiles has been a subject of much discussion, and for a considerable time it was thought that a certain vacuum effect occurred immediately under the tread of the rubber tire, which sucked the fine binding mate-

rial from the road stones. As the automobile wheel passed, it was noticed that more or less dust was raised, and that usually a considerable amount of binding material was carried away from the roadway. It is now known that the shearing force against the direction of the motion of the automobile is the primary source of trouble. This shearing force is developed at the contact of the rear tire with the road surface, and may easily attain 400 pounds for each rear wheel under unfavorable conditions. The circular section of the automobile tire necessitates deformation when it is in contact with the road and causes secondary shearing at the surface. A partial vacuum does occur under the rear quadrant of the rapidity moving wheels and behind the body of the automobile itself. Eddy currents of air are, therefore established which increase in strength with the speed and size of the machine and which cause the finely pulverized road material to leave the surface and pass off the road in considerable volume. The automobile tire itself produces little, if any, grinding effect on the road stone, and can not, therefore, replace the "fines" which have been removed. When irregularities, such as lumps and depressions or loose stone, exist on a road, the pounding effect of automobiles at high speeds is very harmful to the road and the machine, and increases as the square of the speed. The centrifugal force at times has an effect in tending to push the surface material to the outside and destroy the crown of the road, and it also varies with the square of the speed.

With the combined shearing effect under the rear wheels and the loss of binder, a dry macadam road necessarily disintegrates. When the road stones in the surface have become even slightly loosened, the harmful action of the automobile is enormously accelerated, and when the surface has once become generally loosened the normal pressure due to the weight of the automobile comes into play to increase the ruts and eventually to destroy the top course completely and even to cut through to the foundation. The harmful effect of automobiles at high speed is, therefore, undoubtedly greater than at low speed. The point at which increased speed becomes a menace depends partly on the road condition. Speed on a perfectly smooth and homogeneous surface, such as asphalt or concrete, in itself does no damage. Change in speed or acceleration is directly harmful, because the shear increases under the driving wheels.

A. D. Williams, Chief Road Engineer of West Virginia

A. D. Williams, who has been appointed Chief Road Engineer of West Virginia, was born on a farm in Pocahontas County, W. Va., May 22, 1878. He was educated in the public schools, and taught school in 1896, 1897 and 1898, attending college parts of each year.

He commenced work in civil engineering as a rodman for the C. & O. Railroad in August, 1899, and served on survey work as rodman, leveler and transitman, and was on residency work for the Greenbrier division of this railroad between August, 1899, and December, 1900. He was inspector of masonry for the same railroad between December, 1900, and September, 1901. During the next year Mr. Williams served as engineer for the Iron Mountain & Greenbrier Railroad in construction and location work. Between September, 1902, and June, 1903, he was an engineer for the West Virginia Pulp & Paper Co., in charge of railroad and location work. During the years 1904 and 1905, Mr. Williams was chief engineer of the Greenbrier & Iron Mountain Railroad, and also consulting engineer for the Donaldson Lumber Co., the Marlinton & Camden Railroad Co. and other enterprises. In 1906 and 1907 he was consulting engineer and abstractor for land companies.

In 1909 Mr. Williams was a member of the West Virginia Legislature, serving as chairman of the committee on roads. In this capacity he assisted in drafting the revised road laws of the state and was also author of the forest, game and fish law and of the prohibition amendment to the state constitution adopted at the election of 1912.

In 1894 Mr. Williams started in business as a road contractor, and he has also been interested in the manufacture and sale of lumber. Between 1900 and 1905 he was the owner and editor of the Marlinton Messenger, a country newspaper. He is prominent in church and Sunday-school circles and has represented the state of West Virginia at various conventions held by different organizations.

A. D. WILLIAMS, CHIEF ROAD ENGINEER OF WEST VIRGINIA.

In accordance with the law enacted at the last session of the Legislature, Mr. Williams, as Chief Road Engineer, is also the professor in charge of the Railway and Highway Department of the State University.

Revised Estimates of the cost of paving East and West Main Sts., Batavia, N. Y., amount to $91,000 instead of $113,000, as was stated at first.

A Municipal Paving Plant in Columbia, S. C., has been suggested to the City Council of that city by Mayor Gibbes. The establishment of a Department of Public Works is also under consideration.

Widening the Roadway of Hillsboro St., Raleigh, N. C., to a uniform width of 66 ft. has been definitely decided upon by the City Council. The improvement will add 16 ft. to the present width, making the total width between property lines 99 ft. The street will be paved with asphaltic concrete and the work will comprise between 30,000 and 40,000 sq. yds.

Plans for Street Work in Lake Charles, La., include the paving of 52 city blocks on the principal residence streets. The material to be used will vary in accordance with the wishes of the property owners, as follows: Ryan St., brick; Kirby St., asphalt; Pujo St., bitulithic; Broad St., creosoted wood block; Division st., tarvia; Hedges St., asphaltic concrete. Bids will be opened Oct. 9.

A Reinforced Concrete Highway Bridge of ten spans has been completed across the Aare River, near Bern, in Switzerland. The structure, which is known as the Halen Bridge, consists of a main arch span 286 ft. between springing lines; two girder approach spans, each 33 ft. long on the north end, and four arch spans, each 69 ft. long, and three girder spans, each 33 ft. long on the south end. The main arch, which crosses the river, has a rise of 112 ft.

Plans for a new Bridge over the Miami River, at Dayton, O., have been approved by the emergency committee of the Board of Commissioners of Montgomery County. The new bridge will take the place of one destroyed by the floods last spring and will be a three-span structure 380 ft. long. The old bridge had two spans and was 224 ft. in length. The projected bridge will be 7 ft. higher than the old and its approaches will be correspondingly longer. A 50-ft. reinforced concrete culvert will replace the old viaduct over the mill-race at the east end of the bridge.

The New State Highway Commission of South Dakota

In accordance with the terms of the new state highway law of South Dakota, noted in "Good Roads" for Sept. 6, Governor Bryne of that state has appointed a highway commission consisting of E. C. Issenhuth, N. O. Monserud and B. M. Wood.

E. C. Issenhuth, who was appointed chairman of the commission, was born in Iowa, May 2, 1858, and moved to South Dakota 33 years ago, locating in Huron, in 1880. He later removed to Redfield where he now resides.

Mr. Issenhuth has filled various political positions in South Dakota, and during the sessions of 1907, 1909 and 1911 was a member of the House of Representatives of that state. In his first session he introduced a highway measure which was defeated. In 1911 he introduced another measure relative to the control, supervision, construction and repair of public highways. This measure became a law, and since that time Mr. Issenhuth has been known as the "Father of the Good Roads Law" in South Dakota. The road extending from Watertown to Belle Fourche, S. D., was originally named the Issenhuth Highway in his honor, but later at Mr. Issenhuth's request it was renamed the Red and Yellow Trail.

E. C. ISSENHUTH, CHAIRMAN OF THE SOUTH DAKOTA STATE HIGHWAY COMMISSION.

N. O. Monserud was born on a farm in Allamakee County, Ia. As a young man he secured a practical education along commercial lines and engaged in banking and real estate business. He lived for a time in South Dakota, and then returned to Iowa and took charge of the First National Bank of Linn Grove. He maintained that connection for four years, and then moved to Humboldt, S. D. He is now president of the State Bank of Humboldt.

Mr. Monserud has always been much interested in the betterment of rural conditions, and for a number of years has taken part in Farmers' Institute work and corn contests. He has also taken an active interest in highway improvement, and constructed personally the first road drag used in Humboldt.

N. O. MONSERUD, MEMBER OF THE SOUTH DAKOTA STATE HIGHWAY COMMISSION.

B. M. Wood was born in Rapid City, S. D., March 25, 1887. He was educated in the schools of Kansas, Missouri and South Dakota, and was graduated from the law department of the University of South Dakota in 1910 with the degree of LL. B. He immediately entered the practice of law with his father, Chauncey L. Wood, former Mayor of Rapid City.

In March, 1912, Mr. Wood was selected as a delegate to the convention which formed the South Dakota Scenic Highway Association, and was made secretary. As a result of his activities in this connection he was elected Secretary of the South Dakota Good Roads Association when it was formed at Pierre, Aug. 21, 1912, and at the same time was appointed personal representative of Governor Vessey on a pathfinding tour between Winnepeg and Galveston over the Meridian Highway.

B. M. WOOD, MEMBER OF THE SOUTH DAKOTA STATE HIGHWAY COMMISSION.

He was the author of a good roads law, which was passed at the thirteenth session of the South Dakota Legislature. He was considered as a candidate for mayor of Rapid City in 1912, until it was discovered that he lacked three months of having attained the required age of 26 years prescribed by the state law for mayors of cities under the commission form of government.

Personnel of the Ontario Public Roads and Highways Commission

As previously noted in "Good Roads," a commission to have charge of highway work in the province of Ontario, Canada, has been created. The body is designated as the Ontario Public Roads and Highways Commission, and consists of Charles A. Magrath, William A. McLean and Anthony M. Rankin.

Charles A. Magrath, who was appointed chairman, was educated as a land surveyor and followed that calling for some years in the Canadian Northwest. He took an active part in development work in Alberta, devoting his attention to irrigation and railway interests in the southern section of that province. For a time he was at Lethbridge as manager of the Alberta Coal and Railway Co.

CHARLES A. MAGRATH, CHAIRMAN OF THE ONTARIO HIGHWAY COMMISSION.

Between 1891 and 1907, Mr. Magrath was a member of the Northwest Legislative Assembly and was for a time a member of the Haultain Cabinet without portfolio. He was elected to the Dominion House of Commons in the conservative interest in 1908, and in 1911 was appointed a member of the International Joint Commission, under the treaty between Great Britain and the United States, created principally to deal with questions involving international waters.

William A. McLean, C. E., who has been made secretary of the commission has been engaged in the civil engineering profession since his graduation from college in 1893. At that time he entered the office of the city engineer of St. Thomas, Ont., and in 1896 he entered the service of the provincial government of Ontario. His present appointment as Chief Engineer of Highways is the culmination of a series of promotions. For several years he has been Provincial Engineer of Highways of Ontario. Mr. McLean is a member of the Canadian Society of Civil Engineers and of the Ontario Land Surveyors and Engineers' Club of Toronto. He is a vice president of the American Road Builders' Association, and represented the Province of Ontario at the recent road congress at London.

W. A. McLEAN, SECRETARY OF THE ONTARIO HIGHWAY COMMISSION.

Anthony M. Rankin, M. L. A., the third member of the commission, has been prominent in public affairs for a number of years. He was for several years reeve of the township of Collins Bay, Ont., and is at present a representative in the Provincial Parliament for the County of Frontenac, Ont. During his incumbency as reeve of Collins Bay he gave much attention to the improvement of roads, and in 1911 was made Honorary President of the Ontario Good Roads Association.

ANTHONY M. RANKIN, MEMBER OF THE ONTARIO HIGHWAY COMMISSION.

AMERICAN ROAD BUILDERS' ASSOCIATION

150 NASSAU STREET
NEW YORK, N. Y.

President
SAMUEL HILL, Maryhill, Wash.

First Vice President
HAROLD PARKER, Worcester, Mass.

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Through the courtesy of the publisher of "Good Roads," this page, each month, is devoted to the use of the American Road Builders' Association. It is solely in the interests of the Association, and it is the desire of the Executive Committee that all members feel that this space is their own, and that they contribute freely to it, not only as regards anything concerning the Association itself, but also that which will further the good roads movement. Besides the official announcements of the Association, there will appear on the page contributions by members, items of news concerning the Association activities and personal notes about its members. All contributions should be sent to the headquarters of the Association at 150 Nassau Street, New York, N. Y.

Executive Committee:
Geo. W. Tillson
R. A. Meeker
E. L. Powers

The Convention

Plans for the Ninth Annual Convention of the A. R. B. A., known as the Fourth American Good Roads Congress, at the First Regiment Armory, Broad and Callowhill Sts., Philadelphia, Pa., are being rapidly matured by the Convention Committee.

The general scheme for the arrangement of the technical sessions which has proved so successful in the past is to be followed again this year, and the open discussion of subjects of especial interest to the delegates rather than the presentation of long set papers will be the order of procedure. While discussions will be given an even more prominent place on the program than heretofore, there will be no lack of papers by the foremost experts on the subjects covered. These speakers are being selected solely because of their fitness to deal with the questions assigned them, and among their number will be included, as heretofore, the men who are recognized as the leading authorities of this country and Canada.

Announcement of the speakers and their topics will be made later. The following program outline given out by the Convention Committee indicates in a general way the topics which will be discussed at the technical sessions:

Subject A—Organization

1. Highway Officials—Their Duties and Powers.
2. Division of Expense, of Responsibility and of Authority between the various Municipal and Other Units Participating in a Road or Street Improvement.
3. The Relation to Each Other of the Contractor, the Chief Engineer, the Resident Engineer and the Inspector.
4. Details of Arrangements for the Use of Convict Labor.

Subject B—Construction

1. The Proper Determination of the Amount of Re-Alignment and of Grading to be Done.
2. The Factors Governing a Proper Selection of a Road or Street Pavement or Surfacing.
3. Materials and Methods Suitable for Road Surfaces.
4. Unit Price vs. Lump Sum Contracts.
5. Plant Equipment.
6. Preliminary Traffic Census.
7. Dirt Roads.

Subject C—Maintenance.

1. Sub-Organization for Securing Efficient Maintenance.
2. General Methods of Repairs and Renewals.
3. Methods of Dust Prevention.
4. Maintenance of Different Road Surfaces.

As in each of the four previous years, the exhibition of road building machinery and materials will be an interesting and instructive adjunct of the convention. It will include everything that has a place in the plant of the up-to-date road contractor, all the materials entering into the construction of the modern roadway and a variety of special exhibits of interest to road builders and those interested in road building. Among the latter will be the educational exhibits by states, municipalities and institutions that formed so successful a part of the exhibition of last year. The exhibition will be held in the same building as the technical sessions. Applications for space are being received at the headquarters of the Association daily, and there is every indication that all of the available space will be spoken for long before the opening of the convention and that the Fifth Annual Good Roads Exhibition will be the most complete display of its kind ever made.

The local committees for the reception and entertainment of the delegates are being formed and nothing will be spared to make the affair most enjoyable.

The convention committee consists of Samuel Hill, George W. Tillson, R. A. Meeker, E. L. Powers, Wm. H. Connell, Wm. H. Kershaw and John A. Gaffey.

Notes

F. E. Ellis, of Melrose, Mass., a former director of the A. R. B. A. and well known in road contracting circles in Massachusetts and New York, is at present superintending the development of the estate of T. G. Plant at Moultonboro, N. H. The work includes the construction of a number of private roadways.

Clarence A. Kenyon, President of the Indiana Good Roads Association and one of the directors of the A. R. B. A., recently returned from abroad, arriving at New York on September 7. Mr. Kenyon left this country in March, and traveled extensively in Europe besides attending the Third International Road Congress at London in June, at which he was one of the representatives of the American Road Builders' Association. Previous to the London meeting, Mr. Kenyon toured Spain, Italy, Switzerland, France, England and Wales, and after its close visited Norway, Sweden, Finland and Russia. The trip through Norway was by automobile, as were many of the side trips in the several countries which he visited. During his stay abroad Mr. Kenyon devoted much time to the study of foreign roads and road building methods.

Nelson P. Lewis, Chief Engineer of the Board of Estimate and Apportionment of New York, N. Y., Geo. W. Tillson, Consulting Engineer to the President of the Borough of Brooklyn, New York, N. Y., Major W. W. Crosby, Consulting Engineer, Baltimore, Md., Arthur H. Blanchard, Professor of Highway Engineering at Columbia University, New York, N. Y., and D. B. Goodsell, Assistant Engineer, Bureau of Highways, Borough of Manhattan, New York, N. Y., the five members of the American Society of Civil Engineers who reported to that socicety on the Third International Road Congress at a recent meeting, are all A. R. B. A. members.

Two A. R. B. A. members, Arthur H. Blanchard, Consulting Highway Engineer and Professor of Highway Engineering at Columbia University, and Prevost Hubbard, Consulting Chemist in charge of the Division of Roads and Pavements, Institute of Industrial Research, Washington, D. C., and a lecturer in highway engineering chemistry at Columbia University, have formed a partnership under the firm name of Blanchard & Hubbard, Highway Efficiency Experts. The offices of the firm will be at Broadway and 117th St., New York, N. Y. At present Messrs. Blanchard and Hubbard are retained by Commissioner John H. Delaney as the Advisory Highway Board of the New York State Department of Efficiency and Economy.

MEETINGS

National Paving Brick Manufacturers' Association

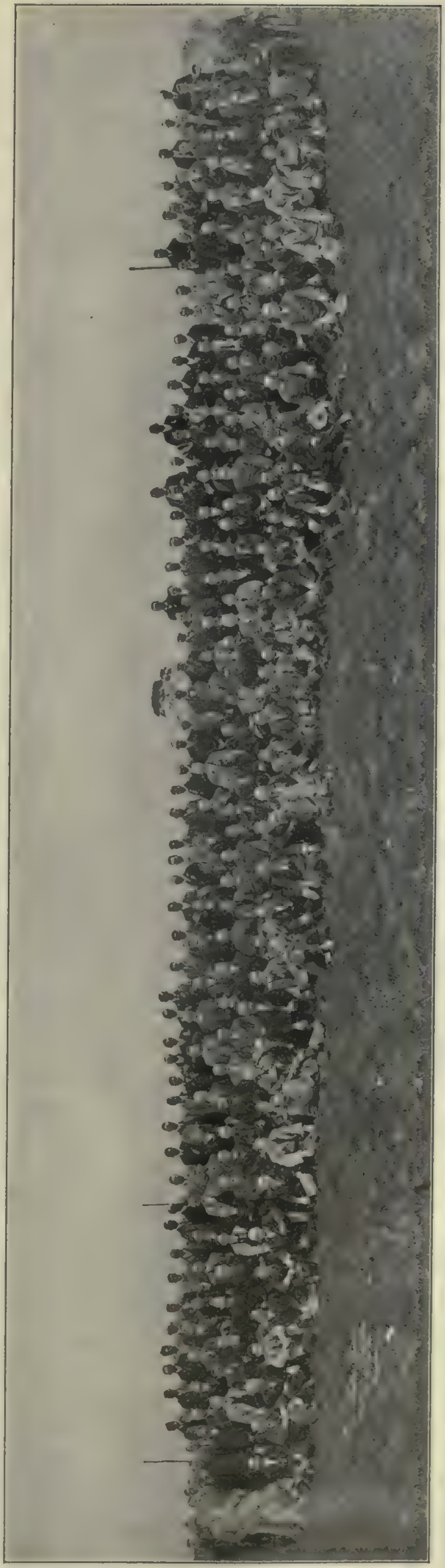
The tenth annual convention of the National Paving Brick Manufacturers' Association, which was held at the Hotel Statler, Cleveland, Ohio, September 17 and 18, was attended by about 300 members and visitors.

The program of the morning session on Sept. 17 was as follows: Roll call of membership; annual address by President Charles J. Deckman; address on "Association Work," by Secretary Will P. Blair; address on "Publicity," by Assistant Secretary H. H. Macdonald; reports of officers; reports of committees; unfinished and new business, and the election of officers.

Trips of inspection of the brick roads of Cleveland and vicinity commenced at 10 o'clock and continued at regular intervals throughout the day. About 250 members, engineers and contractors, participated in these trips, which were held under the direction of representatives of Roehl Brothers Co., paving brick manufacturers of Cleveland.

The following officers were reelected: President, Charles J. Deckman; Secretary, Will P. Blair; Assistant Secretary, H. H. Macdonald; Treasurer, C. C. Barr. The following Board of Directors was elected: J. B. Wilcox, Alliance, O.; Edward Rodgers, Alton, Ill.; R. A. Doan, Nelsonville, O.; W. N. Alderman, Athens, O.; C. C. Barr, Streator, Ill.; C. C. Blair, Youngstown, O.; J. B. Hammond, Bolivar, Pa.; F. M. Brady, Cleveland, O.; J. W. Robb, Clinton, Ind.; H. C. Adams, Danville, Ill.; C. J. Deckman, Cleveland, O.; C. P. Mayer, Bridgeville, Pa.; J. G. Barbour, Canton, O.; F. L. Manning, Portsmouth, O.; O. N. Townsend, Zanesville, O.; D. R. Potter, Clarksburg, W. Va.; John H. Simpson, Dayton, O.; John W. Hall, Baltimore, Md.; R. L. Lewis, Glouster, O.; W. R. Barnhart, Jr., Wooster, O.; W. P. Blair, Cleveland, O.; L. A. Culver, Veedersburg, Ind.; G. C. French, Canton, O.; and J. R. Zmut, Cleveland, O.

A banquet was held in the Lattice Room of the Hotel Statler in the evening. C. C. Brown, editor of "Municipal Engineering," was toastmaster. Among those who addressed



GROUP OF DELEGATES AT THE TENTH ANNUAL CONVENTION OF THE NATIONAL PAVING BRICK MANUFACTURERS' ASSOCIATION, HELD IN CLEVELAND, OHIO, ON WEDNESDAY AND THURSDAY, SEPT. 17 AND 18, 1913.

the guests at the banquet were Will P. Blair, Cleveland; E. H. Christ, Grand Rapids, Mich.; Munson A. Havens, Secretary, Cleveland Chamber of Commerce; Professor Edward Rich, Sanitary Engineer for the State of Michigan; J. C. Gabelman, Assistant Chief Engineer of Streets, Chicago, Ill.; R. F. Cooksey and H. D. Williar of the Engineering Department of Baltimore, Md.; W. D. Uhler, of the Bureau of Highways and Street Cleaning, Philadelphia, Pa.; F. J. Cellarius, Dayton, O.; B. F. Deerdorff, Muncie, Ind.; A. H. Hinkle, of the Ohio State Highway Department; H. W. Klausmann, Indianapolis, Ind.; George L. Campen, Omaha, Neb.; M. R. Sherrard, Newark, N. J., and others.

Pennsylvania State Good Roads Convention

The Pennsylvania State Good Roads Convention, which was held under the auspices of the Pennsylvania Motor Federation in the Chamber of the House of Representatives in the State Capitol, Harrisburg, Pa., on Sept. 18, was attended by delegates from various sections of the state. A special train from Philadelphia brought 72 delegates from that city and many of the delegates from different sections came in automobiles.

The convention was addressed by Governor Tener of Pennsylvania and Chief Justice John P. Elkin of the Supreme Court, both of whom spoke in behalf of improved roads. Other speakers were Robert P. Hooper, President of the Pennsylvania Motor Federation and Mrs. Mabel C. Jones, President of the Women's Suffrage Union of Pennsylvania. All the speakers favored the proposed $50,000,000 bond issue which will be decided by the voters of the state at the November election. Joseph M. Weeks, Chairman of the Good Roads Committee of the Pennsylvania Motor Federation, presided.

At a regular meeting of the American Society of Civil Engineers, held at the society's house, 220 West 57th St., New York, N. Y., on the evening of Wednesday, September 17, the reports from the society's delegates to the Third International Road Congress were received and discussed. The delegates were Nelson P. Lewis, Chief Engineer of the Board of Estimate and Apportionment of New York, N. Y.; Geo. W. Tillson, Consulting Engineer to the President of the Borough of Brooklyn, New York, N. Y.; Major W. W. Crosby, Consulting Engineer, Baltimore, Md.; Arthur H. Blanchard, Professor of Highway Engineering at Columbia University, New York, N. Y., and D. B. Goodsell, Assistant Engineer, Bureau of Highways, Borough of Manhattan, New York, N. Y.

Previously Reported

(Issues of September 13, 20, and 27.)

AUBURN, CAL.—Promotion Meeting, September 2. Page 138, Sept. 20.

CARROLLTON, ALA.—Mass Meeting, August 28. Page 133, Sept. 13.

COLORADO-TO-THE-GULF HIGHWAY ASSOCIATION.—Clayton, N. M., August 28. Page 133, Sept. 13.

CONFERENCE FOR THE ADVANCEMENT OF RURAL LIFE.—Highway Improvement Session, De Kalb, Ill., Sept. 5. Page 138, Sept. 20.

COUNTY COMMISSIONERS OF PENNSYLVANIA.—Twenty-seventh Annual Convention, Williamsport, Pa., August 13 and 14. Page 138, Sept. 20.

DAVIDSON AND RANDOLPH HIGHWAY ASSOCIATION.—Organization Meeting, Denton, S. C. Page 133, Sept. 13.

LANE COUNTY ROAD BUILDERS' CLUB.—Organization Meeting, Eugene, Ore., August 28. Page 133, Sept. 13.

MISSISSIPPI STATE HIGHWAY ASSOCIATION.—Organization Meeting, Meridian, Miss., August 26. Page 141, Sept. 20,

PIKES PEAK HIGHWAY ASSOCIATION.—Organization Meeting, Colorado Springs, Colo., August 28. Page 137, Sept. 20.

THREE STATES GOOD ROADS RALLY.—Organization Meeting, Eureka, Cal., August 20 and 21. Page 137, Sept. 20.

TRAFFIC CLUB.—Good Roads Meeting and Luncheon, Denver, Colo., August 28. Page 133, Sept. 13.

COMING MEETINGS

October 7-10.—American Society of Municipal Improvements.—20th Annual Meeting, Wilmington, Del. Secretary, A. Prescott Folwell, 15 Union Square, New York, N. Y.

October 22-23.—Southern Appalachian Good Roads Association.—Annual Convention, Asheville, N. C. Secretary, H. B. Varner, Lexington, S. C.

Nov. 10-11.—Georgia-Carolina Good Roads Congress—Augusta, Ga. Secy., J. C. Harper, 511 Dyer Bldg., Augusta, Ga.

November 10-15.—United States Good Roads Association.—Convention, St. Louis, Mo. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

December 9-12.—American Road Builders' Association.—10th Annual Convention, 4th American Good Roads Congress and 5th Annual Exhibition of Machinery and Materials, First Regiment Armory Bldg., Philadelphia, Pa. Secretary, E. L. Powers, 150 Nassau St., New York, N. Y.

February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

BOOK NOTICE

TEXT-BOOK ON HIGHWAY ENGINEERING.—By Arthur H. Blanchard, C. E., A. M., Professor of Highway Engineering, Columbia University, New York, N. Y., and Henry B. Drowne, C. E., Instructor in Highway Engineering, Columbia University, New York, N. Y. Cloth; 8vo. xiii + 762 pp.; illustrated; tables and diagrams; 234 figures. John Wiley & Sons, Inc., 432 Fourth Ave., New York, N. Y. $4.50.

In this book, according to the authors' preface, the arrangement of the subject-matter is based largely on lectures prepared by them for their various classes and upon their practice as highway engineers. They state that the book was written primarily from the standpoint of the instructor and the student, "giving, first, the logical order and arrangement of the subject-matter, and second, sufficient detail to thoroughly acquaint the student with the principles and practice of modern highway engineering." It is also stated that the book is, however, sufficiently broad in its scope to serve as a comprehensive reference book for the experienced engineer.

The subject of highway engineering is treated by the authors in 27 chapters, the titles and number of pages occupied by each being as follows: (1) Historical Review, 16 pages; (2) Preliminary Investigations, 24; (3) Surveying and Mapping, 25; (4) Design, 43; (5) Drainage, 17; (6) Foundations, 23; (7) Earth and Sand-Clay Roads, 35; (8) Gravel Roads, 17; (9) Broken Stone Roads, 59; (10) Bituminous Materials, 57; (11) Dust Prevention by the Use of Palliatives, 20; (12) Bituminous Surfaces, 46; (13) Bituminous Gravel and Bituminous Macadam Pavements, 31; (14) Bituminous Concrete Pavements, 52; (15) Sheet Asphalt and Rock Asphalt Pavements, 37; (16) Wood Block Pavements, 27; (17) Stone Block Pavements, 20; (18) Brick Pavements, 33; (19) Concrete Pavements, 14; (20) Miscellaneous Roads and Pavements, 9; (21) Street Cleaning and Snow Removal, 19; (22) Car Tracks, 11; (23) Pipe Systems, 7; (24) Comparison of Roads and Pavements, 26; (25) Sidewalks, Curbs and Guttters, 17; (26) Bridges, Culverts and Guard Rails, 32; (27) Economics, Administration and Legislation, 22.

One of the subjects which at present is of especial interest to highway engineers is that of the construction of roads with bituminous material. This is treated at length by Messrs. Blanchard and Drowne, the six chapters devoted to bituminous construction occupying 243 pages. This portion of the book, embracing Chapters 10 to 15, inclusive, contains much that will be read with interest. Among the features are lists of definitions, tables showing the occurrence of asphalt and a comprehensive synopsis of the principal tests for bituminous materials.

Among the 234 figures comprising the illustrations are halftones showing various kinds of road surfaces, failures due to a variety of causes, and many of the well-known machines used in road construction and maintenance. There are also many diagrams and drawings showing sections of roads, and plans, elevations and sections of appurtenant structures such as culverts, drains and the like.

NEW PUBLICATIONS

NEW YORK HIGHWAY NEWS; Vol. 1, No. 1. Published by the New York State Highway Commission, Albany, N. Y.—9x12 ins.; illustrated.

This publication, according to the "foreword," is issued by the State Commission of Highways in order that those interested in the work of state highway improvement may be kept in touch with its progress. It is stated that as an introductory issue "it has been deemed timely to present expressions from the administrative executives of this department giving in detail the scope of their duties, authorities under which their functions are exercised and outlining policies to be pursued. Later editions will take up the discussion and explanation of local projects in all sections of the state. If practicable, arrangements will be made to issue this bulletin periodically. Copies will be mailed on application to the State Highway Commission, Albany, N. Y." The editor of the publication is James T. Taaffe, Secretary to the Commissioner. The first number contains a series of articles by various officials of the State Highway Department, a list of the officials of the commission and of the divisions and division engineers, a list of the counties showing the distribution of the funds from the second $50,000,000 bond issue and a list of the highway contracts advertised during the year. The publication consists of 12 pages and is well illustrated by half-tones showing completed roads and road work in progress.

JOURNAL OF THE INSTITUTION OF MUNICIPAL AND COUNTY ENGINEERS; Vol. 1, No. 1—8x10¼ ins.; illustrated. Published by the Institution of Municipal and County Engineers, Thos. Cole, A. M. Inst. C. E., Secretary, 92 Victoria St., London, S. W.

The publishing of this journal has been undertaken in accordance with a suggestion made by City Engineer A. H. Campbell of Edinburgh in a paper read at the annual meeting of the Institution of Municipal and County Engineers in London in 1912. Mr. Campbell argued that there was need for such a publication in order to keep the members in touch with the doings of the society and with each other. The journal will replace the yearly volume of the "Proceedings" and, according to the announcement of J. W. Cockrill, President of the Institution of Municipal and County Engineers and chairman of the journal committee, is intended not to replace any of the periodicals upon which the institution has heretofore depended, but to bring together in one publication the various matters which the institution desires to bring before its members. The secretary of the institution, Thos. Cole, has been appointed editor and A. F. May, a son of a former president of the institution, has been made advertising manager. It is announced that the dates of issue will not, for the present, be fixed long in advance, but that there will be one issue in each calendar month, and during the months when the institution is the most active—April, May, June and July—there will be an issue near the middle of the month, making 16 during the year. The first number, dated July, 1913, consists of 48 pages of editorial matter, including a report of the annual meeting; a biographical sketch of J. W. Cockrill, Borough Surveyor of Great Yarmouth, the new President of the institution, and other matter.

REPORTS

STATE HIGHWAY COMMISSION OF ALABAMA, SECOND ANNUAL REPORT; for the year from March 1, 1912, to March 1, 1913. Bulletin No. 4. Paper; 6x9 ins., 79 pp.; illustrated.

This report, submitted under date of July 6, 1913, by the State Highway Commission and the State Highway Engineer and Secretary, covers the operations of the State Highway Department for the fiscal year indicated. It consists of a detailed statement of the work accomplished in the various counties that have accepted state aid, including cost data, and a summary of the work in the state as a whole. There are also included the rules, regulations and instructions adopted by the State Highway Commission for officials and resident engineers. The major portion of the report is taken up by the detailed statements for the several counties, arranged alphabetically. The report is illustrated by halftones showing bridges and roads before and after improvement and examples of completed roads of various kinds, including sand-clay, chert and top soil.

MASSACHUSETTS HIGHWAY COMMISSION, TWENTIETH ANNUAL REPORT. For the fiscal year ending November 30, 1912. Cloth; 6x9 ins., 333 pp.; illustrated; inset map.

This report consists of two parts, the first covering the subject of state highways and motor vehicles and the second the supervision of telephone and telegraph companies, Part 1 occupies 200 pages and comprises the report of the Massachusetts Highway Commission, consisting of Wm. D. Sohier, Chairman, F. D. Kemp and J. W. Synan; the report of Chief Engineer A. W. Dean, printed as Appendix A, and twelve other appendices. The first portion of this part, the report of the commission, covers the regular work of the department in connection with state roads and the supervision of automobiles and also a number of special phases of the work. Among the latter is the matter of traffic census, which is discussed at length. This subject is also taken up in Appendix L, which consists of 28 pages of traffic records. The illustrations consist of three halftones, two showing improved roads and the other a 42-ft. span reinforced concrete bridge. The inset is a map of Massachusetts showing in red roads petitioned for, roads laid out, and improved town roads.

REPORT OF THE CHIEF ENGINEER OF THE BOARD OF ESTIMATE AND APPORTIONMENT OF THE CITY OF NEW YORK; for the year 1912. Paper; 6¾x10 ins., 300 pp.; inset tables.

This report, submitted to Mayor Wm. J. Gaynor of New York City by Nelson P. Lewis, Chief Engineer of the Board of Estimate and Apportionment, under date of May 1, 1913, comprises the report of Chief Engineer Lewis and the report of Deputy Chief Engineer Arthur S. Tuttle, together with 37 tables accompanying the report of the Deputy Chief Engineer. In addition to the 37 tables in the back of the book, many of which are in the form of folded insets, there are numerous other tables printed in the text. The report covers the work of the office of the Chief Engineer of the board and the matters which have been studied and reported upon by that office during the year 1912. In the report of Chief Engineer Lewis, which occupies 29 pages, the principal features of the work are commented upon briefly, while the report of Deputy Chief Engineer Tuttle to Chief Engineer Lewis, with the tables accompanying it, sets forth the various matters in detail. A large part of the report deals with street work, among the matters of especial interest being the city plan, the paving policy of the city, Queens Boulevard, the removal of encroachments, grade crossing elimination, assessments for street openings, and the Interborough Parkway. Among the tables of especial interest are No. 10 which shows the number and estimated cost of assessable physical improvements authorized at meetings of the board during 1912, and Nos. 12 and 13, which show the grading and paving improvements authorized during the year.

AMERICAN AUTOMOBILE ASSOCIATION, PROCEEDINGS OF THE SECOND FEDERAL AID GOOD ROADS CONVENTION, held at Washington, D. C., March 6 and 7, 1913. Paper. 7x10¼ ins., 126 pp.; illustrated.

This report comprises the printed proceedings of the convention held at Washington, D. C., last March by the American Automobile Association for the purpose of promoting federal aid in the construction of highways. Besides many addresses and discussions, forming the proceedings, the report contains a list of the officials of the association, the report of the committee on resolutions and a list of the delegates present. The illustrations, which are excellent halftones, consist principally of views of improved roads in various parts of the country. The report is well printed on heavy white paper, the cover being of tinted paper with the emblem of the A. A. A. printed in colors on the front.

PERSONAL NOTES

L. G. Voorheis of Crowley, La., has been appointed City Engineer of Lafayette, La.

J. L. Champion, City Engineer of Eveleth, Minn., died at his home in that city September 1.

C. W. Leavitt has been engaged as civic expert to prepare a plan for the city of Berlin, Ontario.

John B. Donelson, Vice President of the Southern Asphalt and Construction Co. of Birmingham, Ala., has resigned.

John C. Koch, Professor of Adjunct Civil Engineering at the University of Louisiana and specialist in highway construction in connection with the University, has resigned.

Samuel H. Lea has been appointed City Engineer of Charlotte, N. C., succeeding Joseph Furth who recently resigned. Mr. Lea was formerly State Engineer of South Dakota.

A. T. Laing, lecturer in highway engineering and Secretary of the Faculty of Applied Science and Engineering of the University of Toronto, recently returned from a trip to Italy, Switzerland, France and Great Britain, where he made a study of road conditions.

Charles Jones, Past President and Honorary Secretary of the Institution of Municipal and County Engineers, of England, died on Aug. 24 at the age of 83 years. Up to the time of his death Mr. Jones was actively engaged as Borough Engineer of Ealing, in which capacity he had served for a continuous period of 50 years. He was one of the founders of the Institution of Municipal and County Engineers.

T. R. Agg, formerly Road Engineer of the Illinois Highway Commission, has been elected Assistant Professor of Civil Engineering at the Iowa State College, where he will have charge of the work of instruction in the course of highway engineering. The new road law of Iowa, requiring a county engineer in each county, is said to have created a demand for competent highway engineers, and on this account the State College has made provisions for giving more instruction in highway engineering during the present year. Besides his work in instruction, Mr. Agg will be engaged in the work of road experimentation, for which an annual state appropriation of $10,000 is available.

NEWS OF THE TRADE

Warren Brothers Co. has recently published a booklet entitled "Warrenite is the Solution of the Country Road Problem as to both New Roads and Surfacing Old Macadam Roads." A table showing the development of the use of Warrenite and bitulithic throughout the country and in British Columbia since 1910 is given, as is also a series of opinions from different authorities on the use of various materials for highway construction. The booklet comprises 28 pages and cover, and measures 6 by 9 ins.

Three sets of specifications, one for the construction of one-course concrete street pavements, another for the construction of two-course concrete street pavements and the third for the construction of one-course concrete highways, have been published and are being distributed by the Universal Portland Cement Co., of Chicago, Ill. The three specifications are printed separately in the form of paper-covered pamphlets, 6 by 9 ins. in size, each of which includes, besides specifications, a contract form, notes on construction and drawings showing sections of pavement.

"The Wonderland of Trinidad" is the title of a profusely illustrated booklet recently issued by the Barber Asphalt Paving Co., of Philadelphia, Pa. The booklet is 6 by 9 ins. in size and consists of 20 pages and cover. The text and illustrations describe and illustrate the island of Trinidad, its asphalt lake and the mining and handling of the asphalt. The illustrations are excellent halftones showing scenes in various parts of Trinidad and many of the operations incident to the taking of the asphalt from the lake and its transportation to the coast for shipment. The book is well printed and executed and contains much interesting information regarding the production of asphalt.

The Bain Wagon Co. of Kenosha, Wis., has recently issued an attractive booklet describing the various types of Bain wagons. The text of the booklet is devoted to a description of the various processes of the construction of the wagons and of the classes of material and workmanship in their make-up, and tables of weights, dimensions, capacities, prices, etc., of the various styles. The booklet comprises 56 pages and cover and measures 7½ by 9½ ins., and is illustrated throughout with halftones showing the different classes of wagons and their parts, and interior and exterior views of the factory. The cover is printed in six colors.

The Glen Wagon & Car Corporation, of Cortland, N. Y., has been organized with a capital of $120,000 for the purpose of manufacturing patent dumping wagons, dump and spreading cars, portable dump boxes and reversible engine hauling wagons. The new company will occupy 100,000 sq. ft. of the Cortland Wagon Company's plant which will be equipped with new machinery for the manufacture of its line of goods. It is the intention of the company to purchase the patterns and rights of patents known as "star equipment" made at present by the Glen Wagon Co., of Seneca Falls, N. Y. It is considered that the new company will have greater facilities for handling the business, better shipping conditions and a more efficient labor market for its line of manufactures in Cortland than is possible in Seneca Falls. The company expects to eventually extend its line so as to include gravel machinery and road oiling wagons. The officers of the company are as follows: President, John R. Manning, Marathon, N. Y.; Treasurer, T. R. Clark, Marathon; Vice President and General Manager, Henry M. Glen, Seneca Falls, N. Y.; Secretary, Grove Maxson, Cortland, N. Y.

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Copy for advertisements of which proofs are to be submitted to advertisers should reach the New York office as follows: For insertion in the first issue of the month, by the fifteenth of the preceding month; for other issues, by noon on Thursday of the week before date of issue.

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STATEMENT

of the ownership, management, etc., of GOOD ROADS, published weekly, at New York, N. Y., required by the Act of August 24, 1912:

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(Signed) E. L. POWERS, President & Manager.

Sworn to and subscribed before me this thirtieth day of September, 1913.

ADOLPH HANSEN,
(Seal) Notary Public, Kings County.
(Certificate filed in New York County).
(My commission expires March 30, 1914).

Organization of Bureau of Township Highways in Pennsylvania

Plans for the organization of the Bureau of Township Highways as a division of the State Highway Department of Pennsylvania, and the taking over of the township highways of the state, carrying into effect the law which was enacted at the last session of the State Legislature and approved July 22 of this year by Governor Tener, have been completed. The measure becomes actually effective early in December, when the newly elected township highways boards of the various townships take office. The establishment of the bureau, however, was accomplished Sept. 22, and Joseph W. Hunter, First Deputy State Highway Commissioner, was placed in charge.

Under the act the state will be divided into districts, and a district superintendent of township highways will be appointed in each. Township supervisors will act under orders of the district superintendent.

By the provisions of the law more than 80,000 miles of township roads sustained by local taxation will come under the control of the state.

The act also abolishes the payment of road taxes in labor, 50 per cent. of the total amount of road tax annually collected in each township being paid over by the state to the township.

The tenure of office of township supervisors, which was formerly four years for each of the three supervisors, has been changed, the act providing for the election this year of township supervisors for four and six-year terms. This has occasioned some confusion in the filing of nomination papers on the part of the various candidates, as many of them did not know of the change in the length of the term, and did not designate for which term they were candidates. The result is that after the November election, in many cases, the supervisors will be obliged to draw lots to decide which of them shall serve four years and which for the full term of six years.

Streets and Highways Section at the Lyons International Urban Exhibition

Section 2 of the International Urban and French Colonies Exhibition, which will be held at Lyons, France, from May 1 to Nov. 1, 1914, will be devoted to streets and highways.

The section comprises classes 2 to 10 of the 287 classes into which the entire exhibition is divided. They are designated as follows: Class 2.—City Plans (Old and New), Plans for Extension of Cities. Class 3.—Paving and Tarring, Dust Prevention. Class 4.—Sweeping and Watering. Class 5.—Smoke. Class 6.—Streets and Open Spaces. Class 7.—Signs. Class 8.—Fire Protection (Organization and Equipment). Class 9.—Protection Against Floods. Class 10.—Hoisting Machinery.

The exhibition is stated to be under the patronage of the President of France and the French government.

Repaving Riverside Drive, New York City

Work on the contract for repaving Riverside Drive between 72nd and 110th Sts., New York, N. Y., has been commenced.

The specifications call for a 3-in. surface of asphaltic concrete, composed of crushed stone and Bermudez asphalt, on a Portland cement concrete foundation. The contract includes a five-year maintenance clause.

THE ROAD CONGRESS AT DETROIT

The third annual convention of the American Highway Association, designated as the "Third American Road Congress," was held at Detroit, Mich., from September 29 to October 4. The congress was held under the auspices of the American Highway Association, the American Automobile Association and the Michigan State Good Roads Association, and was participated in by a number of other organizations consisting for the most part of local good roads associations. The sessions of the congress were held on the second floor of the Wayne Gardens and exhibits of road and street machinery and materials were made on the lower floor of the building and in tents adjoining it on two sides.

The sessions of the congress on Monday and Wednesday, except the finance session on Wednesday afternoon under the auspices of the American Bankers' Association, were under the auspices of the American Highway Association, those on Tuesday morning and Thursday were under the auspices of the American Automobile Association, and the afternoon session on Tuesday was under the auspices of the American Bar Association. The proceedings on Friday comprised the sixth annual convention of the Michigan State Good Roads Association, the day being designated as "Michigan Day," while on Saturday morning the session was again under the direction of the American Highway Association.

The first session of the congress was called to order at 10:30 a. m., Monday mornning, by Logan Waller Page, President of the American Highway Associtition and of the congress. After an invocation by Dr. Joseph A. Vance, Pastor of the First Prebyterian Church of Detroit, Chas. B. Warren, First Vice President of the Detroit Board of Commerce, welcomed the delegates on behalf of the city, taking the place of Mayor Oscar B. Marx, who was unable to be present. President Page then read a letter from President Woodrow Wilson regretting his inability to be present and conveying his greetings to the congress. Similar letters were read from Attorney General McReynolds, Postmaster General Burleson, Secretary of the Navy Daniels and Secretary of the Treasury McAdoo. The reading of these letters was followed by the presidential address by Mr. Page, read by President Philip T. Colgrove of the Michigan State Good Roads Association. Other addresses were made by A. G. Batchelder, Chairman of the Executive Committee of the A. A. A., in place of President Laurens Enos of that association who was not present; Judge J. M. Lowe, President of the National Old Trails Road Association, and Col. Wm. DeH. Washington of the Board of Consulting Engineers of the New York State Highway Commission.

The afternoon session was called to order at 2:45 p. m. by President Page, who introduced Secretary of Agriculture David F. Houston, who made the principal address of the afternoon, touching upon the activities of the Department of Agriculture in connection with road making and discussing at some length federal aid in road work. Secretary Houston was followed by A. W. Campbell, Deputy Minister of Railways and Canals of Canada, who spoke upon the highway situation in that country; by Col. Wm. D. Sohier, Chairman of the Massachusetts State Highway Commission, whose topic was "The Roads of England and France," and by Frank W. Buffum, State Highway Commissioner of Missouri, on "The Missouri Plan."

On Monday, from 5 to 7 p. m., a reception in honor of Secretary Houston and Deputy Minister Campbell was given by the Detroit Board of Commerce at 64 Lafayette Boulevard. In the evening a subscription banquet was held at the Hotel Pontchartrain in honor of the distinguished guests at the congress. Geo. T. Moody, of Detroit, was toastmaster, and among the speakers were Deputy Mininster A. W. Campbell; Mayor Marx of Detroit; Judge Roland Baggot of Dayton, Ohio; Geo. C. Diehl of the A. A. A. Good Roads Board; J. O. Reaume, Minister of Public Works of Ontario; Representative Wm. P. Borland of Missouri; Col. Wm. D. Sohier, and President Wm. Livingstone of the Lake Carriers' Association.

The national legislation session, under the auspices of the Amercan Automobile Association, was called to order at 10:15 Tuesday forenoon by Chairman Geo. C. Diehl of the Good Roads Board of the A. A. A. The first speaker was Congressman Dorsey W. Shackleford of Missouri, who outlined his plan for federal aid. Representative Shackleford was followed by Edward H. Butler, Publiisher of the "Buffalo Evening News," who spoke at some length on conditions in New York state and advocated federal aid. The next speaker was Congressman Wm. P. Borland of Missouri, whose address was a criticism of the Shackleford plan for federal aid and an outline of the Borland plan. After Representative Borland's address, Chairman Diehl announced the resolutions committee named by President Page. This committee, of which Mr. Diehl was made chairman, consisted of one member from each state at that time represented in the congress and was as follows: Alabama, W. S. Keller, State Highway Engineer; Arkansas, Judge Joseph Asher; Arizona, Judge T. G. Norris; California, A. B. Fletcher, State Highway Engineer; Colorado, A. J. Lawton, Commissioner of Public Works, Colorado Springs; Connecticut, James H. MacDonald, former State Highway Commissioner; District of Columbia, Charles P. Light, Field Secretary, American Road Congress; Delaware, J. D. Bancroft; Georgia, Professor C. M. Strachan, Dean of Engineering, University of Georgia; Illinois, A. N. Johnson, State Highway Engineer; Indiana, C. A. Kenyon, Indianapolis; Iowa, Professor T. H. MacDonald, State Highway Engineer; Kansas, W. S. Gearhart, State Highway Engineer; Louisiana, W. E. Atkinson, State Highway Engineer; Maine, Lyman H. Nelson, Chairman, State Highway Commission; Maryland, R. Keith Compton, Chairman, Paving Commission; Baltimore; Massachusetts, Louis R. Speare, former President, A. A. A.; Michigan, P. T. Colgrove, President, Michigan State Good Roads Association; Minnesota, George W. Cooley, State Engineer; Missouri, Major Frank W. Buffum, State Highway Commissioner; Montana, William Jordan, Jr., City Engineer, Helena; Nebraska, G. E. Parisoe, Secretary, Omaha-Lincoln-Denver Road Association; New Hampshire, S. Percy Hooker, State Superintendent of Highways; New Jersey, A. G. Batchelder, Chairman, Executive Committee, A. A. A.,; New Mexico, Francis E. Lester, President, State Association Highway Officials; New York, George C. Diehl, Chairman, Good Roads Board, A. A. A.; North Carolina, Dr. Joseph Hyde Pratt, State Geologist; Ohio, L. M. Brown; Oklahoma, Col. Sidney Suggs, State Highway Commissioner; Oregon, J. R. Penland, Albany; Pennsylvania, John A. Wilson; Rhode Island, John A. Richmond, member State Board of Public Works; South Carolina, W. P. Cantwell, County Supervisor, Charleston; Tennesee, Dr. J. D. Henderson, Knoxville; Texas, Judge Albert S. Eyler, El Paso; Utah, Richard R. Lyman, Vice Chairman, State Roads Commission; Vermont, J. W. Votey, Dean of Engineering, University of Vermont; Virginia, Captain P. St. J. Wilson, State Highway Commissioner; Washington, M. Roy Thompson, County Engineer, Tacoma; West Virginia, George B. Chorpening, Member, State Roads Commission; Wisconsin, A. R. Hirst, State Highway Engineer; Wyoming, A. J. Parshall, State Engineer; Canada, Hon. A. W. Campbell, Deputy Minister of Railways and Canals, Ottawa.

After the announcement of the resolutions committee, Chairman Diehl introduced Chas. Thaddeus Terry, Chairman of the National Legislative Board of the A. A. A., who discussed the question of federal aid. The last address of the session was made by former State Highway Commissioner James H. MacDonald of Connecticut, who had been expected to speak at the afternoon session on Monday, on "Road Development in Connecticut."

The session on Tuesday afternoon was devoted to the subject of state road legislation and management and was held under the auspices of the American Bar Association. It was called to order at about half past three by Frederick D. Wadhams, of Albany, N. Y., who presided. The first address was made by Secretary John T. Doyle of the U. S. Civil Service Commission, who spoke on "The Merit System in Road Administration." Mr. Doyle was followed by J. E. Pennybacker, Secretary of the American Highway Association, with a paper entitled "A Plan for Simplifying Road Legislation in the States." The next speaker was A. H. Houston of Ohio, Chairman of the committee for revising the road laws of the state, who spoke on the work of that committee. At the close of Mr. Houston's remarks, Mr. Pennybacker spoke again, urging the appointment of a committee of five on uniform road legislation to confer with the corresponding committee of the American Bar Association. It was finally voted that such a committee be appointed by President Page. The next speaker was Chas. Thaddeus Terry, who spoke briefly on the need for uniform legislation. The last speaker of the session was C. A. Kenyon, President of the Indiana Good Roads Association.

The construction and Maintenance Session on Wednesday morning was called to order at 10:20 a. m. by State Highway Engineer A. N. Johnson of Illinois, who presided in place of Col. E. A. Stevens, State Highway Commissioner of New Jersey, who was not present. The program for this session included a number of technical papers, each followed by a discussion to be opened by an especially selected speaker and then thrown open to the meeting. Most of the papers scheduled for presentation were summarized briefly by their authors, after which the speaker opening the discussion was allowed 10 minutes and each delegate desiring to speak from the floor was limited to 2 minutes. It had been planned to have printed copies of all papers in the hands of delegates in order to permit discussion without the reading of the entire paper, and most of the papers were printed and distributed. In one or two cases, the authors of the papers were not present and the papers were not read. These will undoubtedly be incorporated in the official proceedings of the congress. The first paper taken up was entitled "Unsurfaced Roads" by State Highway Engineer W. S. Keller of Alabama. The discussion was opened by Geo. W. Cooley, State Engineeer of Minnesota. This was followed by "Gravel Roads, Their Construction, Maintenance, Cost and Special Treatment" by State Superintendent of Highways S. Percy Hooker of New Hampshire. The discussion on this paper was opened by Leonard Tufts, of Pinehurst, N. C. Because of the absence of State Highway Commissioner Stevens of New Jersey, no summary of his paper, "Treatment of Wornout and Raveled Macadam Surfaces," was given. The discussion, however, was opened by State Commissioner of Public Roads Robert C. Terrell of Kentucky. The next paper, which was omitted in the program, was entitled "Development and Maintenance of Highways in Allegheny County, Pennsylvania" by John S. Gillespie, Road Commissioner of that county. Commissioner Gillespie was followed by Chief Engineer S. D. Foster of the Pennslyvania State Highway Department with a paper on "Bituminous Macadam, Construction and Maintenance," the discussion of which was opened by Chairman A. D. Gash of the Illinois State Highway Commission. A paper on "Drainage Structures" was presented by State Highway Engineer A. R. Hirst of Wisconsin, the discussion being opened by State Highway Engineer T. H. MacDonald of Iowa. The subject of "Brick Roads" was treated in a paper by Road Engineer J. M. McCleary of Cuyahoga County, Ohio, the discussion being opened by R. Keith Compton, Chairman of the Paving Commission of Baltimore. The last formal paper, "Selection of Road Materials," by Director L. W. Page of the U. S. Office of Public Roads, was read by title only and was not discussed. The session was concluded by addresses and discussions by Will P. Blair, Secretary of the National Paving Brick Manufacturers' Association, who discussed the selection of road materials and the construction of brick pavements; Judge Joe Asher of the Little Rock Board of Trade, Little Rock, Ark., who explained the district system in vogue in that state; A. C. Jackson, President of the Illinois State Highway Association; "Col." Jeff Davis, President of the International Itinerant Workers' Union, who is generally known as "The Hobo King," and others.

The afternoon meeting on Wednesday was divided into three sessions—the contract session, the finance session and the economics session. The meeting was called to order at 3 p. m. by J. R. Wemlinger, Secretary of the American Society of Engineering Contractors, the chairman of the session. The first speaker was Wm. L. Bowman, Civil Engineer and Attorney-at-Law of New York City, who presented a brief summary of his paper, "Legal Suggestions Respecting Road Building Contracts." The discussion on this paper was opened by James M. Head, Ex-Mayor of Nashville, Tenn. After the presentation of the paper entitled "The Protection and Upkeep of Road Equipment" by Daniel J. Hauer of New York, N. Y., Chairman Wemlinger relinquished the chair to Chairman A. D. Gash of the Illinois State Highway Commission, who presided over the finance session. Three papers were scheduled for this session—"Financing Road Improvement" by Wm. G. Edens, President of the Illinois Highway Improvement Association; "Bond Issues for Road Improvement" by S. E. Bradt, Vice President, First National Bank of De Kalb, Ill., and "Highway Accounting with Special Reference to Maintenance" by Halbert P. Gillette, Editor-in-Chief, "Engineering and Contracting." Messrs. Edens and Gillette not being present, their papers were not presented, the only paper coming before the meeting being that of Mr. Bradt. Mr. Bradt's paper was discussed at some length, after which Dr. Jos. Hyde Pratt, State Geologist of North Carolina, took the chair as presiding officer of the economics session. The first paper scheduled was "Systematizing the Purchase of Road Materials and Equipment" by Henry G. Shirley, Chief Engineer, Maryland State Roads Commission. As Mr. Shirley was not present, the paper was read by title only. After speaking briefly on the paper of Mr. Shirley, Dr. Pratt introduced Capt. P. St. J. Wilson, State Highway Commissioner of Virginia, who summarized his paper "The Labor Problem in Road Construction." After the discussion of this paper by State Highway Engineer W. E. Atkinson of Louisiana and others the meeting adjourned.

The program for Wednesday included an evening session at the Convention Hall of the Hotel Pontchartrain, at which there were scheduled a paper on "California's $18,000,000 State Highway System" by State Highway Engineer A. B. Fletcher, and an address on "Dirt Roads and Politics" by Chas. P. Light, Field Secretary of the American Highway Association. The program also included moving picture exhibitions with explanatory remarks by Geo. C. Warren of Boston, Mass., W. T. Beatty and B. F. Affleck of Chicago, in illustration of various features of road construction. After the opening of the meeting with the address by Mr. Light, it was found impossible to show the moving pictures because of trouble with the electric current, and this part of the meeting was postponed until the following afternoon.

Thursday was designated as "Road Users' Day," the proceedings being under the auspices of the American Automobile Association. The meeting was called to order at 10.30 a. m. by Chairman Geo. C. Diehl, who announced that before introducing the chairman of the session he wished to call upon Chairman Chas. A. McGrath of the Ontario Highway

Commission and Deputy Minister A. W. Campbell. After Messrs. McGrath and Campbell had made brief addresses. Mr. Diehl introduced Chairman John N. Carlisle, of the New York State Commission of Highways, who presided at the remainder of the session. Chairman Carlisle made a brief address describing the work of the New York State Commission and then introduced Judge J. M. Lowe, of Kansas City, Mo., President of the National Old Trails Road Association, who addressed the congress on the subject of federal aid. The next speaker was N. P. Hull of the legislative committee of the National Grange, who addressed the congress on "The Farmer and The Road." The last speaker was Col. Sidney Suggs, State Highway Commissioner of Oklahoma, who described the progress of road improvement in that state. After the address of Col. Suggs it was announced that the afternoon would be devoted to a discussion of traffic legislation.

The afternoon session was called to order at 3 p. m. by Chairman Carlisle, who introduced as the first speaker Col. Wm. D. Sohier, Chairman of the Massachusetts Highway Commission. After some discussion following Col. Sohier's address, Chairman Carlisle called upon Geo. A. Ricker, First Deputy Commissioner of the New York State Highway Commission, who explained some particular features of traffic legislation in New York State. After further discussion of the general subject by Col. Wm. DeH. Washington and B. F. Stuck, Superintendent of Highways of the Philadelphia & Reading Coal Co., Tremont, Pa., and others, and an address on the Quebec-Miami Road by F. F. Smith, Vice President of the Quebec-Miami Highway Association, the meeting adjourned.

On Thursday evening the annual meeting of the American Highway Association was held at the convention hall of the Pontchartrain Hotel. After accepting the minutes of the last annual meeting at Atlantic City, as read by Secretary Pennybacker, President Page, on vote of the meeting, appointed a nominating committee consisting of A. G. Batchelder, W. T. Beatty, P. T. Colgrove, A. N. Johnson, P. St. J. Wilson, C. A. Kenyon and John M. Goodell. After this committee had retired, the reports of the secretary and treasurer were read and accepted, and addresses were made by President Page, Judge Lowe and others. It was also voted to pass a resolution of thanks to the citizens of Detroit and Wayne County and to the press for the courtesies extended to the congress. The nominating committee reported nominations as follows: President, Logan Waller Page; Vice President, W. W. Finley; Treasurer, Lee McClung; Secretary, J. E. Pennybacker, Jr.; Field Secretary, Chas. P. Light; Directors—L. W. Page, W. W. Finley, James S. Harlan, Alfred Noble, T. G. Norris, Chas. Whiting Baker, A. B. Fletcher, Roy Chapin, Jos. W. Jones and L. E. Johnson. The report of the committee was accepted and the officers and directors unanimously elected. Following an address by President Page, thanking the members for the honor of his re-election, a vote of thanks to the officers of the association was moved by C. A. Kenyon of Indianapolis, and passed. After remarks by various members on the convention and on matters of the association the meeting adjourned.

The sixth annual convention of the Michigan State Good Roads Association, which occupied two sessions on Friday, "Michigan Day," was called to order at 10 a. m. by President Philip T. Colgrove, president of the association. After an invocation by the Rt. Rev. Chas. D. Williams, Bishop of Michigan, Commissioner of Public Works Geo. H. Fenkell of Detroit, welcomed the delegates to the city in place of Mayor Oscar B. Marx, who was unable to be present. In responding briefly on behalf of the association, President Colgrove read, as the presidential address, parts of his annual report, which had been printed and was later distributed to the delegates. After this report, which included the reports of the secretary and treasurer, had been accepted, President Colgrove introduced Governor Woodbridge N. Ferris, of Michigan, who addressed the meeting on "Rural Life and Good Roads." The next speaker was Jesse Taylor, President of the Ohio State Good Roads Federation, whose subject was "Road Legislation and How to Get It." The last address of the morning session was made by J. C. Ketchum, Master of the State Grange, and was entitled "State Grange and Good Roads." At the close of Mr. Ketchum's address, President Colgrove appointed the committees on nominations and resolutions and adjourned the meeting until afternoon.

The afternoon session was called to order at 2:30 p.m. by President Colgrove, who announced that as Chairman Diehl of the resolutions committee of the congress was obliged to leave the city that afternoon the report of the resolutions committee would be received. The report was then read by Mr. Diehl and adopted without discussion. The resolutions, as adopted, were as follows:

> Whereas, the loss by reason of bad roads which everywhere lessens the profits of industry. increases the cost of living and burdens business enterprise amounts to millions annually; therefore, be it
>
> Resolved, that the American Road Congress earnestly favors the creation of a national department of public works directed by a secretary, who should be a member of the President's cabinet.
>
> Resolved, that the American Road Congress favors state highway commissions and state aid for the construction and maintenance of the main roads of the several states.
>
> Resolved, that the American Road Congress favors the establishment of a national road system and favors the construction by the states, counties and towns of the lateral and connecting market highways.
>
> Resolved, that the American Road Congress respectfully requests the Congress of the United States to authorize the President to appoint a commission from civil life, with sufficient appropriation to make a thorough and exhaustive report on and to recommend a system of federal aid.
>
> Resolved, that the American Road Congress respectfully petitions the Congress of the United States to adopt the necessary legislation so that the United States may hereafter be officially represented at the international roads congresses.
>
> Resolved, that the American Road Congress favors the investigation by the United States Office of Public Roads of applications for patents affecting road and bridge construction before letters patent are issued.
>
> Resolved, that the American Road Congress commends the Lincoln Highway Association for its efforts in seeking the establishment by popular subscription of a transcontinental highway as an enduring and useful memorial to Abraham Lincoln, and further commends the National Old Trails Association for its splendid work in the rebuilding of the Cumberland Road and the Santa Fe Trail.
>
> Resolved, that the American Road Congress emphatically indorses the compulsory use of wide tires and road drags.
>
> Resolved, that the American Road Congress favors, wherever practicable, the use of convicts in road construction and maintenance.
>
> Resolved, that the American Road Congress favors long tenure in office of experienced and efficient highway officials.
>
> Resolved, that the American Road Congress expresses its sincere thanks and appreciation to the citizens, commercial organizations and the press of the city of Detroit, of the county of Wayne and of the state of Michigan, for their hearty cooperation and generous hospitality towards this, the greatest of American road congresses.

The first speaker of the afternoon was Judge J. M. Lowe, of Kansas City, Mo., who addressed the convention on "Storm Centers to be Avoided in Campaigns for Better Roads." Judge Lowe was followed by Frank Hamilton, of Traverse City, who spoke on "Trunk Line Roads," with especial reference to the work of the Michigan Pike Association. This same subject was then discussed briefly by Dr. DeKlein of Grand Haven, and Wm. F. Johnston, of Roscommon, Secretary of the Michigan Trunk Line Highway Association. The next speaker was W. M. Bryant of Kalamazoo, Chairman of the Kalamazoo County Road Commission, whose topic was "Use of Prison Labor in Road

Construction." At the close of Commissioner Bryant's address, the committees on resolutions and nominations reported. The report of the committee on resolutions, which was adopted without amendment, embodied the following resolutions:

1. Your committee wishes to extend the thanks of the Michigan Good Roads Association to the American Road Congress for holding its third annual session in our state, and especially for inviting the Michigan association to participate in its proceedings. The sessions of this convention and exhibits brought here have been interesting and instructive to the road builders of Michigan and, we know, have been fully appreciated by them.

2. We wish to extend our thanks to the Board of Commerce and the citizens of Detroit for the hospitality and entertainment which have made our stay here both pleasant and profitable.

3. We also wish to express our hearty appreciation of the efforts put forth by the Wayne County road commissioners and their officials, who have made it possible for the visitors to become fully acquainted with the road building operations of the county, and to see many miles of their splendid concrete highways.

4. We further wish to express sincere thanks and appreciation of the unselfish and efficient work of the officials of the Michigan State Good Roads Association during the past year. The work of our president deserves especial mention in this particular and we should extend sympathy and cheer to his devoted wife, who is now patiently suffering from a bodily affliction which is very hard to bear.

5. The Legislature of Michigan is deserving of the special thanks of this association for the generous appropriation for good roads, for the passage of the trunk line act and of much other needed legislation recommended by this association at its last annual meeting.

6. We wish to express our hearty approval of the Michigan state reward road law, which has resulted in the building of more than 2,000 miles of substantial roadways in this state. Even though some of these roads may look to the tourist as though "they begin nowhere and go nowhere," it can be truthfully said that without exception, these roads have been built on the main lines between the market towns and adjacent farms, and when the system is complete, they will reach from town to town. In the meantime, these disconnected pieces of roads are the best advocates of the good roads cause we have in the state, and the building of them has, incidentally, trained several hundred men in the art of building good roads, which will prove one of the state's best assets as the building of roads continues.

7. Resolved, That this meeting indorse the resolution adopted by the Michigan Trunk Line Highway Association, and that the different good roads associations of the state are urged to use their best efforts to make a general Michigan "Road Bee Day" on June 14, 1914, a success in all parts of the state.

In accordance with the report of the committee on nominations, which was adopted unanimously, all of the officers were re-elected as follows: President, Philip T. Colgrove; Vice President, N. P. Hull; Secretary, A. A. Anderson; Treasurer, J. Edward Roe. The last speaker of the session was Frank F. Rogers, who read extracts from his paper on "Concrete Roads." The discussion by State Highway Engineer A. N. Johnson of Illinois, which was in the form of a paper, was read by title only. The meeting adjourned after the announcement by Secretary Pennybacker of the committee of five chosen by President Page in accordance with the vote of the convention on Tuesday. This committee consisted of F. D. Wadhams, P. T. Colgrove, A. B. Fletcher, J. E. Pennybacker, Jr., and A. N. Johnson.

A short session of the congress was held on Saturday morning, the only business coming before the meeting being the extension of invitations for the 1914 and 1915 congresses. The meeting was called to order at 10 a. m. by President Page, who occupied the chair during the first part of the meeting, later being replaced by Dr. Jos. Hyde Pratt. Invitations for the 1914 congress were extended by representatives of New Orleans, Denver, Atlanta and Peoria, Ill., and for 1915 from Los Angeles, San Francisco and Spokane. The congress was adjourned, sine die, by Dr. Pratt shortly after 11 o'clock.

The exhibits, which occupied the main floor of Wayne Gardens and two tents outside of the building, included a variety of material and machinery for road and street work. the commercial exhibitors were as follows: Holt Manufacturing Co., Peoria, Ill.; American Car & Foundry Co., Detroit, Mich.; American Ingot Iron Culverts; American Steel & Wire Co., Chicago, Ill.; Anderson Tool & Supply Co., Detroit, Mich.; Association of American Portland Cement Manufacturers, Philadelphia, Pa.; Austin-Western Co., Chicago, Ill.; Baker Mfg. Co., Chicago, Ill.;; R. D. Baker & Co., Detroit, Mich.; Barber Asphalt Paving Co., Philadelphia, Pa.; Barrett Mfg. Co., New York, N. Y.; Bausch & Lomb Optical Co., Rochester, N. Y.; R. S. Blome Co., Chicago, Ill.; Buffalo Pitts. Co., Buffalo, N. Y.; Canada Cement Co.; Philip Carey Co., Cincinnati, Ohio; A. B. Chamberlin, New York, N. Y.; Concrete Form & Engine Co., Detroit, Mich.; Detroit Typewriter Co., Detroit, Mich.; Dolarway Paving Co., New York, N. Y.; Dunn Wire-Cut-Lug Brick Co., Conneaught, O.; Eureka Machine Co., Lansing, Mich.; Galion Iron Works Co., Galion, Ohio; Good Roads Machinery Co., Kennett Square, Pa.; Good Roads Supply Co., Detroit, Mich.; Hall-Holmes Co., Jackson, Mich.; Hastings Pavement Co., New York, N. Y..; Robt. W. Hunt & Co., Chicago, Ill.; Chas. Hvass & Co., New York, N. Y.; Jaeger Machine Co., Columbus, Ohio; Jennison-Wright Co., Toledo, Ohio; Kent Machine Co., Kent, Ohio; Keuffel & Esser Co., Hoboken, N. J.; Knickerbocker Co., Jackson, Mich.; Marion Steam Shovel Co., Marion, Ohio; Michigan Portland Cement Manufacturers (8 companies); Milwaukee Concrete Mixer Co., Milwaukee, Wis.; Municipal Engineering & Contracting Co., Chicago, Ill.; National Paving Brick Manufacturers' Association, Cleveland, Ohio; Novo Engine Co., Lansing, Mich.; Original Gas Engine Co., Lansing, Mich.; Orenstein, Arthur Koppel Co., Koppel, Pa.; Port Huron Engine & Thresher Co., Port Huron, Mich.; Portsmouth Culvert Co., Portsmouth, Ohio; Rapid Mixer Co., Grand Rapids, Mich.; Robeson Process Co., Pennington, N. J.; Rumely Products Co., La Porte, Ind.; Shannon Self-Locking Metal Culvert Co., Cincinnati, Ohio; Standard Oil Co., Chicago, Ill.; Steel Protected Concrete Co., Philadelphia, Pa.; Tarrant Mfg. Co., Saratoga Springs, N. Y.; Texas Co., New York, N. Y.; Thomas Steel Reinforcement Co., Detroit, Mich.; Troy Wagon Works, Troy, Ohio; Trussed Concrete Steel Co., Detroit, Mich.; United States Asphalt Refining Co., New York, N. Y.; United States Cast Iron Pipe & Foundry Co., Burlington, N. J.; Universal Portland Cement Co., Chicago, Ill.; Van Duzen, Roys & Co., Columbus, Ohio; Wallis Tractor Co., Cleveland, Ohio; Warner-Quinlan Co., New York, N. Y.; Warren Brothers Co., Boston, Mass.; Wheeling Mold & Foundry Co., Wheeling, W. Va.; Whitman Agricultural Co., St. Louis, Mo.

The following publications occupied booths in the exhibition: "The American City," New York, N. Y.; "Better Roads," Jamestown, Ohio; "Canadian Engineer," Toronto, Canada; "Cement Era," Chicago, Ill.; Concrete-Cement Age, Detroit, Mich.; "The Contractor," Chicago, Ill.; "Engineering and Contracting," Chicago, Ill.; "Engineering News," New York, N. Y.; "Engineering Record," New York, N. Y.; "Michigan Roads and Forests," Detroit, Mich.; "Municipal Engineering," Indianapolis, Ind.; "Municipal Journal," New York, N. Y.; "Pacific Builder and Engineer," Seattle, Wash.; "The Road Maker," Des Moines, Ia.; "Southern Good Roads," Lexington, N. C.

Besides these exhibits there was an exhibit by the U. S. Office of Public Roads, one by the Michigan State Highway Department and one by the New York State Highway Department.

Awards For Street Paving made by the Common Council of Phoenix, Ariz., Sept. 17, amounted to $134,554.33. The Barber Asphalt Paving Co. secured two of the three contracts at an aggregate bid of $100,217.58. The third contract was awarded to the Arizona Asphalt Paving Co. at $34,336.75.

Consolidation of Association for Standardizing Paving Specifications and American Society of Municipal Improvements

The consolidation of the Association for Standardizing Paving Specifications with the American Society of Municipal Improvement was effected during the convention of the latter organization at Wilmington, Del., Oct. 6 to 10.

The consolidation followed the action of the Association for Standardizing Paving Specifications at its recent meeting in Pittsburgh, Pa., when it authorized its executive committee to take up the matter with the American Society of Municipal Improvement at its Wilmington convention.

Good Roads Days in Texas

Governor O. B. Colquitt of Texas has issued a proclamation designating Nov. 5 and 6 of this year as "Good Roads Days." The proclamation reads as follows:

"Whereas, an adequate system of improved public roads is one of the great needs of our state and good roads lend powerful aid to everything good in modern life, while bad roads form an obstacle in the path of progress. Recognizing this fact, the people of Texas have taken hold of this problem with tremendous interest, and it is now one of the foremost economic questions confronting our people, and much good work has been done throughout the state in the past few years in the way of improving our public highways.

"Now, therefore, realizing the necessity for a system of work along this line, and in conformity with my sense of duty in this matter, I hereby designate Nov. 5 and 6, 1913, as Good Roads days, and call upon the people in every county and section of the state to make preparations for working the roads on those days and have meetings to discuss ways and means in the future for building good roads in the various localities throughout the state generally."

Governor Colquitt has promised to either work on the roads himself during the two days or to pay $25 in cash into a good roads fund.

MEETINGS

At a mass meeting of the citizens of Rowan County, Ky., held at the courthouse, Morehead, Sept. 20, plans were outlined for rebuilding the old state road through the county from the Bath County line to the Carter County line, a distance of 16 miles. An executive board and departments of labor and publicity were organized.

The Mountain Division of the Colorado to Gulf Highway Association was permanently organized Sept. 24 at a meeting held at Pueblo, Colo. Victor L. Friar, Secretary of the Trinidad, Colo., Chamber of Commerce, was elected President of the division, and Alva W. Henderson, Secretary of the Colorado Springs Chamber of Commerce, was elected Secretary.

A mass meeting for the purpose of adopting methods for securing improved highways for the Township of Lovelady, N. C., was held at Granite Falls, Sept. 26. Among the speakers were Dr. Joseph Hyde Pratt, State Geologist of North Carolina; J. D. Elliott, A. A. Whitener and Rev. Harte, of Hickory, and Hon. W. C. Newland of Lenoir. A permanent association was organized, and the following officers were elected: Chairman, D. M. Cline; Secretary-Treasurer, Walter M. Moore. It was decided to present a petition to the Caldwell County commissioners asking for a bond election.

A meeting attended by about 150 delegates representing towns between Marshall and Oak Grove, Mo., was held under the auspices of the Blue Book Route Association, at the Courthouse at Higginsville, Mo., Sept. 23. The meeting was held in the interest of a cross-state highway over what is known as the Sni-a-Bar Road through Jackson County, connecting with the old Blue Book Route at Oak Grove, and with the old Santa Fe Trail by way of Marshall. The meeting was addressed by Dr. N. R. Holcomb of Oak Grove; John T. Miller, editor of the Democrat-News, Marshall; James Hammil and L. Ransberger of Mount Leonard; G. A. Frerking of Corder; Daniel Hoefer, President of the Higginsville Commercial Club; Judge John F. Rolf of the Jackson County Court; John Walker, County Engineer of Lafayette County; G. H. Rabius of Mayview; J. C. Hereford and J. T. Powell of Odessa, and others. Announcement was made that arrangements had been perfected to straighten the route of the proposed road between Oak Grove and Odessa, shortening the distance by several miles. On Oct. 15 the road between Oak Grove and Marshall will be dragged by the delegates to the Higginsville meeting.

COMING MEETINGS

October 22-23.—Southern Appalachian Good Roads Association.—Annual Convention, Asheville, N. C. Secretary, H. B. Varner, Lexington, S. C.

Nov. 6-7. — Georgia-Carolina Good Roads Congress — Augusta, Ga. Secy., J. C. Harper, 511 Dyer Bldg., Augusta, Ga.

November 10-15.—United States Good Roads Association. —Convention, St. Louis, Mo. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

December 9-12.—American Road Builders' Association.— 10th Annual Convention, 4th American Good Roads Congress and 5th Annual Exhibition of Machinery and Materials, First Regiment Armory Bldg., Philadelphia, Pa. Secretary, E. L. Powers, 150 Nassau St., New York, N. Y.

February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

The date of the Georgia-North Carolina Good Roads Congress, which was to have been held Nov. 10 and 11, has been changed to Nov. 6 and 7 in order to avoid a conflict with the convention of the United States Good Roads Association, which will be held at St. Louis, Mo., Nov. 10 to 15.

PERSONAL NOTES

A. C. R. Janni, formerly an engineer connected with the Bridge Department of St. Louis, Mo., has established a practice as consulting engineer at New York, N. Y.

E. C. Shoecraft has been appointed City Engineer of Flint, Mich. Mr. Shoecraft was formerly City Engineer of La Porte, Ind.

Arthur L. Adams, formerly City Engineer of Pendleton, Ore., died Sept. 17 at his home in Oakland, Cal., at the age of 49 years.

Robert Neill for the past eight years connected with the computing office of the City Engineering Department of Seattle, Wash., died Sept. 22. He was an associate member of the Pacific Northwest Society of Engineers.

W. H. Fisher, of the Spokane, Wash., City Engineering Department, has been appointed a member of the engineering staff of the Graff Construction Co. of Seattle, Wash. He has been assigned to work on the concrete viaduct at Twelfth St., Kansas City, Mo.

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The Coming Convention at Philadelphia

Plans for the coming convention of the American Road Buiders' Association at Philadelphia, Pa., December 9, 10, 11 and 12, which will be the tenth annual gathering of that organization, are being rapidly matured by the convention committee having the matter in charge.

Although the entire program of the technical sessions has not been definitely decided upon, a general scheme for covering the various subjects to be considered has been prepared and many assignments of papers have been made. As noted in the issue of Oct. 4, the matters to be discussed at the convention will be taken up under three general heads—organization, construction and maintenance—and these will be further subdivided so as to cover every phase of road and street work. Great care has been taken in selecting men especially fitted to discuss the subjects upon which they will speak. Each speaker will be followed by several men who will open the discussion, and these have also been selected because of their qualifications and experience along the several lines upon which they will talk. Although not definitely decided, it is probable that the set papers and discussions will occupy at least five sessions.

A departure from the usual method of conducting the congress will be made this year by the holding of a popular session on Thursday evening. At this meeting addresses will be made by prominent public men who have evinced an interest in highway betterment, and it is planned to have other features which will appeal to laymen as well as to those actually engaged in road work. Governor Lister of Washington has signified his intention of being at the congress and will probably be one of those who will address the meeting on Thursday evening.

On Thursday afternoon the delegates will be taken on an inspection trip through the city. This will afford an excellent opportunity to view street improvements and other work of a like nature.

The local committee is making extensive plans for the entertainment of the delegates and the social features of the convention are being carefully arranged. One of these will be a theater party for the A. R. B. A. members, the exhibitors and official delegates on Wednesday evening. Special provisions are also being made for the entertainment of the ladies attending the congress. An automobile ride around the city has been planned for them on Wednesday afternoon, and other entertainments will be provided.

Applications for space are being received in large numbers and the indications are that it will be necessary to accommodate some of the larger and heavier exhibits outside of the building. The number of spaces already assigned not only assures the success of the exhibition but also indicates that it will be the greatest display of road building machinery and materials ever made at a road congress.

The officers of the association will be quartered at the Bellevue-Stratford Hotel. The sessions of the convention and congress and the exhibition of machinery, materials and methods as well as the place of registration of delegates will be at the First Regiment Armory.

Mountain Highway Improvement in San Bernardino County, California

The Board of Supervisors of San Bernardino County, Cal., is asking for bids for the construction of the Mill Creek Road, and for the erection of five bridges on the Foothill Boulevard. The Mill Creek Road is seventeen miles long and will traverse mountainous territory, running from Mill Creek to Barton Flats through Mountain Home Canyon.

Specifications for the work call for a road with a minimum width of 10 ft. at points difficult of construction and ranging to 20 ft. in other sections. In order to expedite the work of construction two separate contracts will be let. Bids will be received until Oct. 20.

Street Improvement Plans in Fresno, California

The City Trustees of Fresno, Cal., have instructed City Engineer Cronkhite to draw up a resolution of intention for the paving of nearly two miles of city streets.

The proposed improvement includes the paving of L St., between Merced and Amador Sts.; Fresno Ave., between Silvia St. and the alley between Harvey and Lewis Aves.; Tulare Ave., between Angus and First Sts., and Stanislaus St., between H and I Sts.

New specifications for grading and curbing streets, prepared by City Engineer Cronkhite, have been adopted by the trustees. They call for a crushed rock top dressing on unpaved streets.

Convention of the American Society of Municipal Improvements

The twentieth annual convention of the American Society of Municipal Improvements was held at Wilmington, Del., on October 7, 8 and 9, 1913. The headquarters of the convention were at the Hotel Du Pont, in the auditorium of which the sessions were held, while the exhibits were displayed in rooms adjoining the hall. Nearly three hundred members, associate members and guests registered during the convention.

Monday, October 6, the day before the opening of the convention, was devoted to the preliminary meetings of the various committees of the society. The formal opening of the convention took place at 11 a. m. on Tuesday, October 7, following the meeting of the executive committee earlier in the forenoon. This session was devoted to addresses of welcome by Governor Miller of Delaware and Mayor Howell of Wilmington, a response on behalf of the association by Morris R. Sherrerd, City Engineer of Newark, N. J.; the annual address by President B. E. Briggs, City Engineer of Erie, Pa., and the regular business of the association. The business included the reports of the secretary and treasurer, of the executive committee, of the finance committee and of some special committees, and the appointment of committees on nominations and place of meeting. One of the most important actions taken was that effecting the consolidation of the Association for Standardizing Paving Specifications with the American Society of Municipal Improvements. This matter was acted upon by the former organization at its recent meeting at Pittsburgh, at which authority was given its executive committee to take up the matter with the American Society of Municipal Improvements. The organization formed by the consolidation will be designated as the American Society of Municipal Improvements.

The afternoon and evening sessions on Tuesday were taken up by committee reports and the presentation of papers, among the latter being one entitled "Some Observations on Minimum Illumination for Street Lighting," by Joseph E. Putnam, Assistant City Engineer of Rochester, N. Y. At the evening session Park Superintendent E. R. Mack, of Wilmington, gave an illustrated talk on the park system of that city.

The session on Wednesday morning was called to order at about 10 a. m. It was taken up by the presentation and discussion of papers, by the election of officers for the coming year, and by the transaction of other business of the association. One of the papers presented was "Proposed Standard Specifications for Paving Brick of the American Society for Testing Materials," by Professor Edward Orton, of the Ohio State University, Columbus, Ohio. This was referred to the committee on brick paving specifications. The officers for the coming year, as proposed by the nominating committee and elected by the convention, were as follows: President, Edward H. Christ, Grand Rapids, Mich.; First Vice President, Wm. A. Howell, Engineer of Streets and Highways, Newark, N. J.; Second Vice President, A. F. Macallum, Hamilton, Ont.; Third Vice President, N. S. Sprague, Superintendent, Bureau of Construction, Pittsburgh, Pa.; Secretary, Charles Carroll Brown, Editor, "Municipal Engineering," Indianapolis, Ind.; Treasurer, W. B. Howe, City Engineer, Concord, N. H.; Finance Committee—Leslie B. Christie, Wilmington, Del.; F. J. Collins, Dayton, Ohio; Frank R. Allen, City Engineer, Pine Bluff, Ark.

On Wednesday afternoon the members and guests were tendered a boat ride down Delaware Bay by the City of Wilmington. Immediately after the adjournment of the morning session the delegates were taken by special trolley cars to the wharf, where they boarded one of the Wilson Line steamers, which had been chartered for the occasion. Luncheon was served on board the boat, the party returning late in the afternoon.

On Wednesday evening the first business taken up was that of deciding upon the next place of meeting. The committee having this matter in charge had reported at the morning session, designating Dayton, Ohio, as the meeting place, but some objection being made to the selection of this city, it was voted to defer the consideration of the matter until evening, and as a result Boston was selected. The remainder of the session was devoted to the consideration of committee reports and the presentation (by title) of one paper on fire prevention. The report receiving the most attention at this session was that of the committee on standard specifications, presented by the chairman, Chas. Carroll Brown, of Indianapolis, Ind., who stated that the report as a whole was not ready in its final form, but who made a general statement concerning the work of the committee and of the subcommittees. These subcommittees were eight in number and dealt with wood block, bituminous, concrete, stone block, brick and asphalt paving, macadam and gravel roads and sewers. No report was made by the subcommittee on asphalt paving, and the subcommittee on brick paving reported that no changes in the specifications were suggested. Some correspondence regarding the oil for creosoting wood blocks, which had been made a part of the records of the subcommittee on wood block paving, were read, although no formal report was made to the meeting. The committee on concrete paving reported that it had nothing new to bring before the convention, and that the matter of reinforcing was being discussed. The subcommittee on macadam and gravel roads submitted a progress report. The only specifications presented for adoption were those for stone block paving. The committee having these specifications in charge recommended the adoption of the stone block paving specifications adopted by the Association for Standardizing Paving Specifications at the Pittsburgh meeting, with a few minor changes, principally in the opening paragraphs. The committee also suggested certain matters for discussion and presented additional clauses for insertion in the specifications to make them applicable to the use of sandstone blocks. After considerable discussion the report was adopted. There was also considerable discussion on various features of the construction of other pavements.

The first matter coming before the session on Thursday forenoon was the presentation of the paper entitled "Control of Sidewalk Construction and Maintenance," by A. Prescott Folwell, of New York, N. Y., Secretary of the American Society of Municipal Improvements. This was followed by discussion and the presentation of a paper entitled "The Standard Abrasion Test for Paving Brick—How It Works in Newark," by Wm. A. Howell, Engineer of Streets and Highways, Newark, N. J. The next business coming before the meeting was the report of the committee on standard forms, presented by the chairman, J. C. Hallock, Deputy Chief Engineer of the Department of Public Works, Newark, N. J. This report as presented included the reports of subcommittees on street lighting, street cleaning and refuse disposal, and uniform bidding blanks. There was considerable discussion on this report, principally upon the matter of dividing street work, for the purposes of bidding or reporting costs, into four units—excavation, concrete (base), curb and wearing surface—and it was finally voted that the society adopt the committee's recommendation asking for the separation of these units.

Besides the papers and committee reports, several matters of routine business were taken up at the session.

The afternoon was devoted to an automobile trip over the city in about thirty motor cars secured by the local entertainment committee. Starting from the Hotel Du Pont the delegates were driven to the pumping station and preliminary filters on the Brandywine, then to the Porter Reservoir and then through various streets and parks to the hotel. The trip occupied the entire afternoon and furnished opportunities to inspect various kinds of paving in the city and also an asphaltic concrete pavement in the course of construction.

The last session of the convention was held on Thursday evening and was devoted almost entirely to the discussion of questions not introduced by formal papers. Among the topics discussed were methods of filing maps in city engineers' offices, the use of pipe galleries in streets, methods of repairing openings in pavements, methods of setting street monuments and bench marks and the matter of trees in sidewalk areas. After the close of this "query session" a paper, entitled "Embankment in Road Construction; Proper and Improper Settlement," was presented by Geo. C. Warren of Boston, Mass. Later Mr. Warren showed moving pictures of the operation of Warren paving plants and the laying of bitulithic and Warrenite pavements. A progress report by the committee on traffic on streets was also presented at this session, and the business of the convention closed. The convention adjourned late in the evening, the work of having been completed without the necessity of a morning session on Friday, as provided for in the program.

Besides the steamboat excursion and the automobile trip over the city, there were many other entertainment features provided by the local committee. Some of the delegates were accompanied by their wives, whose entertainment was provided for by a special committee of Wilmington women. Among the entertainment features provided were a trolley ride around the city on Tuesday afternoon, followed by a tea at the Hotel Du Pont; theater parties on Tuesday and Wednesday evenings; a buffet luncheon at the Country Club on Thursday afternoon, followed by an automobile ride around the city and the surrounding country, and a card party on Thursday evening at the Du Pont.

The firms who made exhibits in the rooms adjoining the auditorium at the Hotel Du Pont were as follows: Addressograph Co., Chicago, Ill.; Barber Asphalt Paving Co., Philadelphia, Pa.; Barrett Mfg. Co., Philadelphia, Pa.; Bausch Lomb Optical Co., Rochester, N. Y.; "Better Roads," Jamestown, Ohio; Buff & Buff Mfg. Co., New York, N. Y.; Dunn Wire-Cut-Lug Brick Co., Conneaut, Ohio; Bureau of Inspection, Coleman Du Pont Road, Inc., Wilmington, Del.; Electro Bleaching Gas Co., New York, N. Y.; Good Roads Machinery Co., Kennett Square, Pa.; Lock Joint Pipe Co., New York, N. Y.; "Municipal Journal," New York, N. Y.; National Paving Brick Manufacturers' Association, Cleveland, Ohio; National Water Main Cleaning Co., New York, N. Y.; Robeson Process Co., Pennington, N. J.; Union Clay Products Co., New Brunswick, N. J.; Charles Warner Co., Wilmington, Del.; Warren Brothers Co., Boston, Mass.; Warren-Knight Co., Philadelphia, Pa.; Yellow Pine Manufacturers' Association, St. Louis, Mo.; United States Asphalt Refining Co., New York, N. Y.

In Reply to Circular Letters sent out by the Commercial Association of Galveston, Tex., to the secretaries of all the commercial clubs in the state, asking their views on the proposition of employing state convicts on the roads, responses have been received from about 100 of the secretaries, practically all expressing themselves as strongly in favor of the proposition, and urging that a state meeting be called for some date during the state fair at Dallas. It is believed that it would be an easy matter to assemble a large attendance at that time. The fair will be held Oct. 18 to Nov. 2.

Highway Courses in Iowa State College

The Division of Engineering of the Iowa State College, of which Dean A. Marston, Chairman of the State Highway Commission, is the head, will conduct a short course in highway construction during the coming winter, the sessions of which township trustees, township supervisors and all highway officials in the state may attend.

Professor T. R. Agg, formerly engineer of the Illinois Highway Commission, and now Professor of Highway Engineering in the Iowa State College, has announced that two courses in highway engineering will be included in the engineering school. One of these two courses is a requisite to graduation for students in the engineering course. It includes the detailed study of methods of preparing plans and specifications for highway construction, and methods of construction that have been adopted as standard for all common types of roads and pavements. This course is required, the student being allowed no discretion in the matter.

The other course is elective, and deals with the economic phases of the work of a highway engineer with the idea of giving the student instruction by which he may profit later in administrative positions.

MEETINGS

A good roads and county automobile association was organized at a meeting held recently at Colorado, Mitchell County, Tex.

A rally was held at Mt. Vernon, N. C., Sept. 26, for the purpose of discussing the advisability of holding a bond election for road improvement. A dinner was served in connection with the rally.

A barbeque and basket dinner was held Sept. 25 at Hatcher Springs, Ky., in celebration of the completion of a new turnpike, known as the Trenton-Clarksville highway. Six miles of the highway are in Todd County, Ky., and the other 10 miles are in Montgomery County, Tenn.

COMING MEETINGS

October 22-23.—Southern Appalachian Good Roads Association.—Annual Convention, Asheville, N. C. Secretary, H. B. Varner, Lexington, S. C.

Nov. 6-7. — Georgia-Carolina Good Roads Congress — Augusta, Ga. Secy., J. C. Harper, 511 Dyer Bldg., Augusta, Ga.

November 10-15.—United States Good Roads Association. —Convention, St. Louis, Mo. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

Nov. 20-22.—Alabama Good Roads Association.—Seventeenth annual convention, Mobile, Ala. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

December 9-12.—American Road Builders' Association.—10th Annual Convention, 4th American Good Roads Congress and 5th Annual Exhibition of Machinery and Materials, First Regiment Armory Bldg., Philadelphia, Pa. Secretary, E. L. Powers, 150 Nassau St., New York, N. Y.

February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

Southern Appalachian Good Roads Association

The tentative program for the fifth annual convention of the Southern Appalachian Good Roads Association, which will be held at Asheville, N. C., Oct. 22 and 23, includes the following:

Morning session, Oct. 22—Addresses of welcome by Gov. Locke Craig, of North Carolina; Hon. J. W. Rutherford, Chairman Board of County Commissioners of Buncombe County; Hon. J. E. Rankin, Mayor of Asheville; Hon. H. W. Plummer, President, Asheville Board of Trade, and Hon. E. C. Chambers, President, Asheville-Buncombe County Good Roads Association. Responses by Dr. Joseph Hyde Pratt, President Southern Appalachian Good Roads Association; Hon. William Hodges Mann, Governor of Virginia; Hon. H. D. Hatfield, Governor of West Virginia; Hon. J. B. McCreary, Governor of Kentucky; Hon. Ben Hooper, Governor of Tennessee; Hon. Cole L. Blease, Governor of South Carolina; Hon. John M. Slaton, Governor of Georgia, and Hon. Emmett O'Neal, Governor of Alabama. Address on "State Aid to Counties," by W. W. Finley, President, Southern Railway. Discussion, led by Cyrus W. Kerr, of Tennessee. Address on "What Virginia Is Doing for State Aid," by P. St. J. Wilson, State Highway Commissioner of Virginia. Reports of officers.

Afternoon session, Oct. 22—Address by Hon. William Jennings Bryan, Secretary of State. Reports of road work in the Southern Appalachian section by state road officials of the several states.

Evening session, Oct. 22—Illustrated lecture by a representative of the U. S. Office of Public Roads. Entertainment of the delegates by the city of Asheville.

Morning session, Oct. 23—Paper on "Federal Aid in Road Construction," by Hon. Jonathan Bourne, Chairman of the Joint Congressional Committee on Post Offices and Post Roads. Addresses on "National Organizations," by Charles H. Davis, President, National Highways Association; A. G. Batchelder, Chairman, Executive Board, American Automobile Association, and Charles P. Light, Field Secretary, American Highways Association. Paper on "Relationship of Our Colleges and Universities to the Good Roads Movement," by Edward Kidder Graham, President, University of North Carolina. Reports of committees.

Afternoon session, Oct. 23—Discussion of engineering problems and questions of maintenance by representatives of universities and technical schools and highway officials. Talks regarding work of good roads associations by officers of various organizations. Reports of progress of special highways. Address by Jesse Taylor, President, Ohio Good, Roads Federation. Address on "Good Roads' Days," by Gov. Locke Craig, of North Carolina.

Gov. William Hodges Mann, of Virginia, will preside at the morning session Oct. 22, Gov. Ben Hooper, of Tennessee, at the afternoon session, and Gov. H. D. Hatfield, of West Virginia, at the morning session, Oct. 23.

United States Good Roads Association

A tentative program has been arranged for the convention of the United States Good Roads Association to be held at St. Louis, Mo., Nov. 10-15. The program as arranged to date follows: Monday, Nov. 10, Governor's Day: Address of welcome by Governor E. W. Major of Missouri; response by United States Senator J. H. Bankhead, President, United States Good Roads Association. Nov. 11, Mayors' Day: Address of welcome by Mayor Henry W. Kiel of St. Louis; response by Col. D. W. Potter, Vice President, United States Good Roads Association. Nov. 12, Legislative Day: Invitations to legislators and their families have been extended by the Missouri Congressional delegation and the Missouri legislators. Nov. 13, Farmers Day: Address of welcome by T. C. Wilson, Missouri State Board of Agriculture; response by E. J. Watson, Vice President, United States Good Roads Association. Nov. 14, State Officers' Day: Address of welcome by Lieutenant Governor W. R. Painter of Missouri, Hon. Cornelius Roach, Secretary of State of Missouri; John P. Gordon, State Auditor, and Edward P. Deal, State Treasurer of Missouri; response by Thomas T. Fauntleroy. Nov. 15, Press and Education Day: Addresses of welcome by Howard A. Ganz and E. C. Erwin; response by Capt. Robert E. Lee.

Informal receptions will be held at the Planters' Hotel at 8 P. M. every day except Wednesday, Nov. 12.

A list of speakers and subjects will be arranged later. It is announced that no long papers will be presented, but that there will be short debates along practical lines.

Alabama Good Roads Association

The 17th annual convention of the Alabama Good Roads Association will be held at Mobile, Nov. 20-22. Delegates are expected from several southern states, and the governors of Alabama, Mississippi, Florida and Tennessee have accepted invitations to attend the convention and deliver addresses.

One of the principal issues at the convention will be the launching of a campaign for a $50,000,000 bond issue for highway improvement in Alabama.

An exhibit of road machinery is planned as one of the features of the convention.

PERSONAL NOTES

N. H. Quimby has been appointed Chief Engineer of the Department of City Planning of Philadelphia, Pa.

George B. Ward has been elected President of the City Commission of Birmingham, Ala.

E. E. Sands has been appointed City Engineer of Houston, Tex.

Daniel J. Slowe has been appointed Superintendent of State Highways for the Scranton division of the Pennsylvania State Highway system.

Louis A. Handley has been elected President of the Board of Public Works of Los Angeles, Cal., succeeding A. A. Hubbard.

In the account of the personnel of the Ontario Public Roads and Highways Commission, in "Good Roads" for Oct. 4, the statement was made that W. A. McLean was secretary of the commission. This was an error, Mr. McLean merely having served as secretary pro tem at the first meeting of the commission. Dixon P. Wagner is permanent secretary to the commission. Mr. Wagner is a graduate of Toronto University, Toronto, Ont., and of Oxford University, England.

A dinner in honor of Maurice E. Connolly and G. Howland Leavitt, President and Commissioner of Highways, respectively, of the Borough of Queens, New York, N. Y., was given on the evening of Oct. 11, at the rooms of the Manhattan Automobile Club, 222 W. 59th St., Borough of Manhattan. The dinner was given as a tribute to the amount and quality of highway improvement accomplished under the direction of Mr. Leavitt, during Mr. Connolly's administration.

Governor Craig of North Carolina has issued a proclamation designating Nov. 5 and 6 as "good roads days" and calling upon every able-bodied man in the state to work on the roads on those days. It is planned to organize and conduct the work in a systematic manner so that it will result in durable improvements throughout the state.

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Regulations for the Use of New York State Highways

State Commissioner of Highways John N. Carlisle of New York has issued a set of regulations for the protection of state and county highways, to go into effect Oct. 29. Copies of the regulations have been forwarded to highway officials throughout the state.

The first regulation applies to the use of traction engines, road engines, automobile trucks and other heavy, power vehicles of which the wheels are fitted with flanges, ribs, clamps, cleats, lugs or spikes. Traction engines and road engines are allowed to pass over the highways if all the wheels are provided with cleats not less than 2½ ins. wide and not more than 1½ ins. high, and so placed that not less than two cleats will touch the ground at all times, and with weight distributed equally on all parts of the cleats.

The weight of motor vehicles is limited to 14 tons, including the load. If it is desired to move any load heavier than 14 tons, special permission must be obtained from the State Commissioner of Highways. The regulations also provide that no weight in excess of 8 tons shall be carried on any single axle.

A limit of 800 lbs. per in. in width of tire is also placed on all power vehicles, and permission must be obtained from the State Commissioner of Highways to move any weight in excess of this.

A regulation is included providing that no power vehicle having a width greater than 90 ins. shall be operated on any state or county highway, a single exception being made in the case of traction engines, which may have a width of 100 ins. The speed of power vehicles carrying a weight in excess of 4 tons is limited to 15 miles an hour on state and county highways, and no power vehicle having a weight in excess of 6 tons may be operated on any state or county highway at a greater speed than 6 miles when equipped with iron or steel tires, nor greater than 12 miles when equipped with tires of hard rubber or other similar substance.

Paving Program in San Antonio, Texas

The Mayor and the Streets Committee of San Antonio, Tex., have outlined plans for the paving of the streets of the downtown section of the city. This is in accordance with Mayor Brown's suggestion that the center of the city be paved first, and the work gradually extended to the outlying sections. Wood block is being considered as the material for paving the business streets. A thorough investigation will be made of the condition of the underground conduits, water pipes, sewers, etc., and before the streets are paved all the subsurface work will have to be completed. In addition to the streets to be improved, Alamo, Main and Military Plazas will be paved.

The streets included in the program are as follows: Commerce, Market, Crockett, Houston, Travis, College, Dolorosa, Trevino, Galan, North Flores, Soledad, St. Mary's, Navarro, Jefferson, Nacogdoches, Bonham, St. Joseph, Losoya, Blum, Casion and North Presa Sts., Main Ave. and Aves. C, D and E.

Plans for New State Highways in Washington

The State Highway Board of Washington opened bids Oct. 6 for seven sections of state highway, the total cost of which will exceed $200,000. These sections include the Water Front Road and three sections of the Pacific Highway in Snohomish County, the first section of the Snoqualmie Pass Road, one section of the Olympic Highway and one of the National Park Highway.

In addition, the board has approved plans for the construction of three other sections of the Pacific Highway and one of the Sunset Highway, to be constructed at an approximate cost of $142,000. Construction will commence as soon as the work of securing the rights of way has been completed.

The three sections of the Pacific Highway for which plans have been approved comprise that between Blaine and Custer in Whatcom County, 4⅛ miles long, to cost $37,000; the section from Kalama south, in Cowlitz County, 3.7 miles, to cost $25,000, and that section between Woodland and La Center, Clarke County, 4 miles long, to cost $40,000. On the Sunset Highway the section from Wenatchee north, 6¼ miles long, will be improved at a cost of about $40,000.

State road construction already under way will cost $168,000, making a total to be expended under present plans of about $510,000.

It is estimated that the amount available for state highway construction this year and next aggregates $1,750,000.

Legislation for Opening Streets Through New York City Cemeteries

The office of the Corporation Counsel of New York City has prepared sixteen bills to be introduced at the next regular session of the Legislature, providing for the opening of thirty-three new streets through cemeteries owned by private corporations in the Boroughs of Brooklyn and Queens. Twenty-one cemeteries are affected by the proposed legislation.

In addition, two bills which were introduced at the last session, providing that cemeteries bear the cost of street openings through their lands in the same way as is required of ordinary private property owners, will again be introduced.

The Cypress Hills Cemetery road will be particularly affected by these bills, which, if passed, will have the effect of modifying prices asked for land sold to the city by the cemetery company, inasmuch as the company itself would have to bear its proportionate share of the improvement. Protection of plot owners in cemeteries is provided in a clause which prohibits the sale of plots for non-payment of special assessments, and places the burden on the cemetery corporation. The passage of these bills is favored by Assistant Corporation Counsel Joel J. Squier, head of the Bureau of Street Openings of the Corporation Counsel's office.

In order that there may be no opposition from up-state, the suggested legislation will be made to apply only to cities within the state having a population of 2,500,000, which would affect New York City alone.

The sixteen bills which deal with the opening of streets in cemeteries affect the following streets in Brooklyn: Cypress Hills Rd., 57th and 58th Sts., and Albany Ave.

The streets involved in Queens are as follows: Queens Ave., Fresh Pond Rd., Suburban St., Epsilon Pl., Vermont Ave., Weisse Ave., Metropolitan Ave., Woodhaven Ave., Pitkin Ave., Laurel Hill Blvd., Borden Ave., Betts Ave., Starr St., Astoria Ave., Wilson Ave., Petry Pl., Eliot Ave., Newton Ave., Barrett St., Keystone St., Queens Blvd., Wayland Ave. and Mount Olivet Ave.

Extensive Gutter Construction in Los Angeles, California

The Board of Public Works of Los Angeles, Cal., has practically decided upon a policy which will result in the construction of cement gutters on both sides of more than 1,000 miles of improved streets which have not yet been paved, making a total of over 2,000 miles of gutters to be built.

The streets which will be provided with gutters are in the outlying districts, and have been graded, graveled and curbed. The work will be done at first on those streets where the weed nuisance has become objectionable, or where there are pools of standing water from the flushing of adjacent paved streets, and from the seepage from lawns, and will be gradually extended to include all of the city's improved but unpaved highways. It is stated that the present system of cobblestone gutters provides favorable conditions for the growth of weeds in the streets.

The entire mileage of streets in the city is 1,287. Of this approximately 160 miles are paved.

It is estimated that the cost to the property owners for the construction of gutters on the unpaved streets will be about 20 cts. per front foot.

Akron, Ohio, to Extend Limits

An ordinance which has been before the City Council of Akron, O., for the past three months, providing for the extension of the city limits, has been unanimously indorsed by the council, and will be finally passed when the City Engineer has completed plans showing the new boundary lines.

According to the provisions of the ordinance, the city lines will be extended to the Cuyahoga River on the north; to take in Lovers' Lane on the south; to include the Goodyear allotment and the new city reservoir on the east, to a point 200 ft. west of the Summit County infirmary on the west. The property which the ordinance proposes to annex comprises twelve square miles, and will more than double the present area of the city.

As a result of the extension several miles of streets and sidewalks will be improved. The population will be increased by several thousand, and nearly $4,000,000 will be added to the city tax duplicate.

Street Extension in San Francisco, California

The street officials of San Francisco, Cal., have taken steps toward the extension of Potrero Ave. from its present terminus at 25th St. to Army St. in the Mission district. Later, it is planned to extend the thoroughfare still farther to the westerly line of San Bruno Ave., paralleling the center line of the Ocean Shore railroad.

At present, on account of the fact that the street terminates at 25th St., vehicular traffic is compelled to make a detour of two blocks in order to reach San Bruno Ave. Under the improvement, if effected, traffic can follow Army St. to San Bruno Ave., or else continue over Potrero Ave. to San Bruno.

The extension of the avenue from 25th St. to Army St. will necessitate the acquisition of 36,306 sq. ft. of property valued at 50 cts. a sq. ft. Necessary grading, granite curbing, bituminous surfacing and sidewalk construction will cost $13,916.65, according to estimates, making the total cost of the improvement $32,069.65.

For the further extension of the avenue from Army St. to San Bruno Ave., it will be necessary to acquire 21,410 sq. ft. of property valued at 40 cts. per sq. ft. The additional cost of street work will bring the total cost of this section to $26,958.25.

Street Improvement Plans in Baltimore, Maryland

The Paving Commission of Baltimore, Md., has announced that plans have been made to pave Baltimore St., between Paca St. and the Fallsway, early in 1914. South St., between Pratt and Fayette, and Howard St., between Baltimore St. and the Richmond Market, will also be paved.

This action on the part of the commission has been taken as a result of a decision to hold next fall the centennial anniversary of the writing of the "Star-Spangled Banner" by Francis Scott Key, while a prisoner on board a British battleship in Chesapeake Bay.

Other streets to be improved in the near future include Battery Ave., between Montgomery and York Sts., with granite blocks; Battery Ave., between Hamburg and Montgomery Sts.; Hughes St., between Light St. and Key Highway; Montgomery St., between William St. and Battery Ave.; William St., between Hamburg St. and Warren Ave.; Towson St., between Fort Ave. and Clement St.; Hamburg St., between Sharp and Light Sts.; Trenton St., between Maryland Ave. and Charles St., and Morton Alley, between Lafayette Ave. and Trenton St., with sheet asphalt and Oliver St., between Maryland Ave. and Charles St., with bituminous concrete.

The City Council of Seattle, Wash., is considering the construction of four bridges which, if built, will cost approximately $1,760,000, according to estimates by City Engineer A. H. Dimock. Three of these structures designated as the Fifteenth Avenue, Northwest, the Fremont and the Sixth Avenue, Northeast bridges, will cost $460,000, $120,000 and $380,000 respectively. The fourth bridge which it is proposed to construct over the West Waterway at Spokane Avenue, affording access to West Seattle, will cost about $700,000.

New Highway Divisions in New York State

John N. Carlisle, State Commissioner of Highways of New York, has completed the division of the state into nine engineering divisions, in accordance with the new laws governing state highway work, and has appointed an engineer for each division. Three of the division engineers were reappointed and six are new appointments. The selections were made in compliance with the civil service regulations.

The new divisions, together with the headquarters and funds allotted to each, are as follows: Division No. 1,—Suffolk, Nassau, Westchester, Putnam, Dutchess, Columbia, Greene, Ulster, Orange and Rockland Counties; headquarters, Poughkeepsie; allotment, $10,972,000. Division No. 2,—Albany, Rensselaer, Schenectady, Saratoga, Washington, Warren, Essex and Clinton Counties, headquarters, Albany; allotment, $8,331,000. Division No. 3,—Lewis, Jefferson, St. Lawrence and Franklin Counties; headquarters, Watertown; allotment, $6,366,000. Division No. 4,—Montgomery, Fulton, Hamilton, Herkimer, Oneida and Madison Counties; headquarters, Utica; allotment, $6,314,000. Division No. 5,—Broome, Chenango, Otsego, Schoharie, Delaware and Sullivan Counties; headquarters, Binghamton; allotment, $6,117,000. Division No. 6,—Cortland, Cayuga, Seneca, Wayne, Onondaga and Oswego Counties; headquarters, Syracuse; allotment, $6,219,000. Division No. 7,—Wyoming, Genesee, Orleans, Monroe, Livingston and Ontario Counties; headquarters, Rochester; allotment, $5,779,000; Division No. 8,—Allegany, Steuben, Yates, Schuyler, Chemung, Tioga and Tompkins Counties; headquarters, Hornell; allotment, $5,641,000. Division No. 9,—Niagara, Erie, Chautauqua and Cattaraugus Counties; headquarters, Buffalo; allotment, $7,593,000.

The engineers and the districts to which they have been assigned are as follows: Division No. 1, Bertram F. Wait of New York City; Division No. 2, Harvey O. Schermerhorn of Troy; Division No. 3, Theron M. Ripley of Syracuse; Division No. 4, James S. Sturdevant; Division No. 5, Howard D. Smith of Syracuse; Division No. 6, Charles J. McDonough of Buffalo; Division No. 7, Perry Filkin, Division No. 8, Frederick S. Strong; Division No. 9, William E. Acheson of Troy.

Messrs. Sturdevant, Filkin and Strong were reappointed; the rest are new appointments.

Plans for State Highway System in Idaho

The State Highway Commission of Idaho has designated roads to form a state highway system, and has elected Edward St. Clair Smith State Highway Engineer to commence work immediately on the making of the necessary plans.

The highway system as adopted, comprising six lines, follows: East and west highway, from Olds Ferry on the Idaho-Oregon boundary line, east through Weiser, Payette, Caldwell, Boise, Bliss, Hagerman, Twin Falls, American Falls, Pocatello, McCammon, Pebble, Montpelier and Paris to the Utah line; western north and south highway, from Boise, north by way of Long Valley through New Meadows, Grangeville, Lewiston, Moscow, Coeur d'Alene to Sand Point; eastern north and south highway, from Idaho Falls northwest following Birch Creek to Gilmore, Salmon and Crowfoot Pass, connecting with the Montana state highway; Spokane to St. Regis Pass highway, from Spokane Bridge east to Coeur d'Alene, Wallace and Mullan; McCammon to Utah line highway, from McCammon south through Bannock and Oneida Counties to the Utah boundary.

The counties will be expected to improve their several sections of the state highway system to the extent of grading and building culverts.

State Highway Plans in Ohio

The State Highway Department of Ohio is planning the construction of what is designated as "market road No. 7," between the corporation lines of the cities of Troy and Dayton. This will be a continuation of the Troy-Piqua road, and when built will complete a through hard-surfaced thoroughfare between Dayton and Piqua, one of twelve designated highways styled market roads which will be built across the state, connecting the principal cities under the so-called Hite law.

This law imposes a tax of a half mill upon all property in the state for the purpose of building market roads. It is estimated that the levy this year will raise about $800,000, of which $300,000 will be used for the improvement of the National Pike.

It is stated that the work of building the road between Troy and Dayton will require about two years. The distance is 18 miles and the cost will be from $100,000 to $180,000, depending upon the character of material used. The road will eventually extend from Cincinnati to Toledo.

Movement for Highway Improvement in Oklahoma

The Eastern Oklahoma Agricultural Association is making plans for an active campaign in the interest of highway improvement in the 35 counties of the state, which are represented in the organization.

The first move of this campaign will be to secure the services of an expert from the U. S. Office of Public Roads, and to arrange for a series of lectures in every county maintaining a membership in the organization. Later the association will take up the proposition of building a Kansas-to-Texas highway north and south through Oklahoma, paralleling the Missouri, Kansas & Texas Railroad.

The association is well organized, its membership numbering several thousand farmers throughout the eastern part of the state. It has a branch in every county, with an executive board for every branch, and a central governing board, of which J. F. Darby, of Muskogee, is the head.

Petition to Resubmit Question of County Road System in Branch County, Michigan

Twenty townships of Branch County, Mich., have submitted petitions to the County Board of Supervisors asking the board to agree to a resolution to submit to the voters of the county at the general election in April, 1914, the question of whether or not the vote at the April, 1912, election, authorizing the county road system, shall be rescinded. A total of 325 freeholders of the county signed the petitions. The law requires that at least ten names be attached to each petition, and that one petition be submitted from each of the sixteen townships of the county and from each of the four wards of Coldwater, the county seat.

While each of the twenty petitions required by the law was presented, none had a large number of signatures, and in many instances there were but few more than the required ten. It is considered doubtful if the Board of Supervisors will see its way clear to submit the question, as a great deal of time and money have been expended in the county under the present system.

Fifty-three of the 83 counties of the state are now working under the county road system, and in only one of the 53 has the question ever been resubmitted. In that case the question was resubmitted and lost, but at a subsequent election it was again submitted and carried.

Houston Street, San Antonio, Tex., is to be repaved with creosoted wood blocks between Alamo Plaza and North Flores St. The City Engineer has been instructed to prepare specifications for the work.

New Highway Regulation in Georgia

The State Prison Commission of Georgia has adopted resolutions providing for the employment of a civil engineer or road expert to supervise highway and bridge work. The resolutions terminate the terms of the present staff of five state highway inspectors on January 1, 1914, and provide for the election of four inspectors and one highway expert in their places. If the funds of the state for highway work permit, three additional supervisors or road experts will be employed. The resolution places in effect Section 1194 of Volume 2 of the code of laws of 1910.

MEETINGS

A meeting was held Oct. 6 at the Town Hall, Mokelumne Hill, Calaveras County, Cal., at which a movement was inaugurated for the improvement of the roads of the county. J. M. Eddy, Secretary of the local Chamber of Commerce, was the chief speaker.

A meeting was recently held in San Antonio, Texas, for the purpose of promoting a $1,000,000 bond issue for public improvements in Bexar County, which will be voted upon at an election to be held Nov. 12. The proposed improvements include the expenditure of $200,000 for bridges, and $550,000 for grading and resurfacing roads.

The Air Line Highway Association was recently organized at Stamford, Texas, for the purpose of promoting the construction of a highway between Wichita Falls and Paint Rock. The organization meeting was attended by representatives from Wichita, Baylor, Knox, Jones, Taylor, Runnels and Concho Counties. The following officers were elected: President, Judge H. G. McConnell, Haskell; Vice President, Joe Wilmuth, Ballinger; Secretary, Fred T. Wood, Abilene; Treasurer, J. S. Schultz, Seymour; Field Secretary, Homer D. Wade, of Stamford.

The West Virginia division of the National Highways Association was organized at a meeting held Oct. 8 at Charleston. The meeting was presided over by W. A. McCorkle, former Governor of West Virginia. The following officers were elected: President, W. A. McCorkle; Vice President, S. M. Snyder, Charleston; Secretary, A. D. Williams, Morgantown; Treasurer, Gray Silver, Martinsburg; State Organizer, W. E. Hoffheins, Martinsburg; Assistant State Organizer, L. P. Puffer, Charleston. The members of the division were the guests of the Charleston Chamber of Commerce at a banquet held on the evening of Oct. 8.

A meeting held at Baudette, Minn., Oct. 4, for the purpose of devising ways and means to secure government aid in the construction of roads and ditches in the Chippewa lands, 2,000,000 acres in extent, in Koochiching, Beltrami, Roseau, Marshall and Red Lake Counties, was attended by delegates from the commercial clubs of Baudette, International Falls, Spooner, Warroad, Roosevelt and Thief River Falls. It was planned to petition the members of the House of Representatives from Minnesota to ask the federal government to enact special legislation providing for an appropriation of 50 cts. an acre for roads and ditches for those counties. Preliminary steps were also taken to form a permanent organization of the commercial clubs of the several towns.

A meeting of property owners along the line of the proposed Frederick Blvd. in St. Joseph, Mo., was held recently for the purpose of devising ways and means to secure the construction of the boulevard. A club was formed at the meeting, and P. F. Ozenberger was elected President and William Cook, Secretary. A committee was appointed to present the matter of the proposed improvement to the County Court.

COMING MEETINGS

Nov. 6-7. — Georgia-Carolina Good Roads Congress — Augusta, Ga. Secy., J. C. Harper, 511 Dyer Bldg., Augusta, Ga.

November 10-15.—United States Good Roads Association. —Convention, St. Louis, Mo. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

Nov. 20-22.—Alabama Good Roads Association.—Seventeenth annual convention, Mobile, Ala. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

December 9-12.—American Road Builders' Association.—10th Annual Convention, 4th American Good Roads Congress and 5th Annual Exhibition of Machinery and Materials, First Regiment Armory Bldg., Philadelphia, Pa. Secretary, E. L. Powers, 150 Nassau St., New York, N. Y.

February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

Three good roads associations will hold meetings at Pearsall, Tex., Oct. 30, for the purpose of formulating plans for building highways in southwestern Texas, and to settle on the route of the Nueces Valley Road from Uvalde to Corpus Christi. The three associations are the Nueces County Good Roads Association, the San Antonio-Laredo Highway League, and the San Antonio division of the Meridian Road Association.

PERSONAL NOTES

H. L. Caldwell, of Jacksonville, Ill., has been appointed City Engineer of Carrollton, Ill.

C. F. Redmon, County Road Supervisor of Bourbon County, Ky., has been appointed Road Engineer of that county.

James Harrison, a member of the engineering staff of the York County, Ontario, Road Commission, died recently of paralysis at Woodbridge, Ont.

S. B. Slack, City Engineer of La Grange, Ga., has been appointed Adjunct Professor of Civil Engineering at the University of Georgia, succeeding Professor John C. Koch.

Claude F. Chard, former Assistant City Engineer of East Orange, N. J., has been appointed Hydraulic Civil Engineer with the New Jersey Public Utlity Commission, charged with the inspection of bridge work.

W. S. Harvey, who has been Acting City Engineer of Lethbridge, Alta., since the resignation of A. C. D. Blanchard, in August of this year, has been appointed to the office of City Engineer.

E. F. Kriegsman, Assistant Engineer in the office of the City Engineer of San Francisco, Cal., has been appointed Professor of Civil Engineering at St. Ignatius University, San Francisco. He has been granted a leave of absence by the City Engineer's office.

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"GOOD ROADS DAYS"

Elsewhere in this issue is a brief description, accompanied by several illustrations, of the work carried on in Missouri on the two days late in August designated as "good roads days." The account is not complete, as data for the state as a whole are not yet at hand. Whether they will be available in the future or not is doubtful, since it is probable that accurate records of what was accomplished were not kept in all localities.

Although the setting apart of a day or more for volunteer road work is not a new thing, the Missouri "good roads days" attracted much attention throughout the country and formed the subject of no little criticism, both favorable and adverse. In general, the newspapers—especially those in the West and South—have expressed approval of the plan. But in some places, particularly the larger cities in the East, the comment has been not altogether favorable.

It is natural enough to expect that in some quarters the efforts of the Missourians should be regarded as useless and, for want of a better term, undignified; but in any attempt at criticism it should be borne in mind that conditions differ very greatly in different parts of this country and that methods which in one section might appear ridiculous and entirely unnecessary are quite justified by the totally different conditions in another section.

In the more densely settled East the practice of working out the road taxes, to which the "good roads day," so called, is analogous, has been abolished almost universally, though in some places not until very recently. The replacement of statute labor by a cash tax is, of course, the logical development in that section of the country, not only because industrial conditions would make it impracticable for the average citizen to devote one day or more to working on the roads in person, but because the work which would need to be done would frequently require skill and experience which volunteer laborers would not bring to it. On the other hand, in some parts of the West and South, where the country is not thickly settled, where the cities are few and not large, where a large percentage of the population is engaged in agriculture and, most of all, where the majority of the roads are of earth, gravel, or, at best, macadam, it would naturally be expected that plenty of volunteer labor could be secured and that it could be used advantageously. Moreover, there are temperamental differences between the people of the East and of the West that would tend to make the scheme feasible in Missouri, though impracticable in New York.

The work done in Missouri on the "good roads days" appears to have been not the unorganized, haphazard work which might have been done had each man who worked on the days when the farmers of New York, New England and other states in the East worked out their road taxes. On the contrary, a large part of it appears to have been performed by thoroughly organized forces under competent supervision, working not only willingly but with enthusiasm. It is quite likely that some of the work done in Missouri was useless and that some of it was ill done, but the fact remains, according to the testimony of State Highway Commissioner Buffum and others who were in touch with the work, that improvements having a very considerable value were made. It can, of course, be argued that the total value of the work accomplished during the "good roads days" was less than that which might have been done had each man who worked on the roads contributed money equivalent to the value of two days of his time and had this money been spent for work by skilled labor under trained supervision, and such an argument would undoubtedly be borne out by the facts.

But the actual value of the work accomplished throughout the state can not be taken as the real measure of the success of the undertaking, for, if we understand the situation correctly, the object of Missouri's "good roads days" was not so much the actual improvement of some of the roads as the arousing of public sentiment for road betterment and the demonstration of what could be accomplished by concerted effort. That from that standpoint it was successful is the conviction of many of those in touch with the situation in Missouri, and if Missouri, or any other state, can bring about the enactment of wise highway laws by the holding of so-called "good roads days" that state would seem to be justified in following that plan, even though it is one which could not be recommended for universal adoption.

ORGANIZATION FOR HIGHWAY WORK

For the consideration of the multitude of problems which the road builder of today is called upon to solve, the makers of the program for the coming convention of the American Road Builders' Association at Philadelphia have provided for the discussion of the general subject under three heads—organization, construction and maintenance.

Taken together, these cover practically the entire field of highway work as it affects the actual builder of roads or pavements, whether he be an official, an engineer, a contractor or a subordinate member of the organization of any one of these three. Taken separately, each is of so great importance that only in specific cases is it possible to designate any one as the most important.

Where all the necessary roads have long been built, as in some of the countries of Europe, maintenance is generally regarded as the most important part of road work. In new countries, on the other hand, the chief work is that of construction, though to be of lasting benefit it must be followed by careful maintenance.

Organization is, of course, merely the means to an end, yet without proper organization neither construction nor maintenance can be carried on with the maximum of efficiency and economy. Whether the work of the highway authorities of a community consists of building new roads or maintaining existing roads, those who are called upon to do the work are confronted first with the necessity of organizing their forces if they are to get the best results with the least outlay, for, no matter how great the skill possessed by the individual units of a working force, the results accomplished will fall short of the ideal if those individuals are not brought together into an efficient organization.

The details of organization necessarily vary in different cases and no hard and fast rules can be laid down for the coordination of the duties and responsibilities of the individuals nor for the delegation of authority. There are, however, certain principles which must be observed in every case, of which one of the most essential is that of delegating to each subordinate sufficient authority to enable him to produce the result for which he is held responsible. It is generally considered that the most efficient organizations are those in which the responsible head is one executive officer to whom is given the task of securing definite results with the powers and funds given him. Under him are other executives upon whom are imposed certain duties, in performing which they are expected to follow general rules, but to handle the details without interference. The failure to observe this one fundamental principle has been the rock upon which many an otherwise model organization has come to grief.

In order to show the practical application of some of the principles to which reference has been made, the highway department of the state of Connecticut may be used as an illustration. This department is one of the several state highway departments which have been reorganized recently and the way in which the organization works will be watched with interest, since the worth of any organization is determined not by its theoretical excellence but its efficiency in actual operation.

The head of the department is the commissioner, whose authority is absolute except in so far as it is limited by the highway laws of the state and special acts of the legislative branch of the state government. Immediately under the commissioner are two other executives, one designated as deputy commissioner and the other as superintendent of repairs, the former having charge of all construction work and the latter of repair work. Each of these executives carries on his particular part of the work subject only to the commissioner. Next to the deputy are eight division engineers, each in charge of a particular section of the state and each answerable only to the deputy and the commissioner. Each division engineer is in full charge of all the construction work in his own territory and is strictly an executive having supervision over the field and office work in connection with the surveys for improvement, the staking out of work and the actual performance of the work by the contractors. He has under him as many engineers, draftsmen, inspectors and helpers as are required for the work in his division. He selects these men, assigns them to the various jobs under his jurisdiction and discharges them as he sees fit. In the work of construction, by contract or such other arrangement as may be in force, the division engineer has authority not only to enforce the performance of the work according to the specifications, but also to decide upon questions not covered by the specifications and to make such minor changes as he deems expedient, without referring the matter to headquarters. The inspectors are answerable only to the division engineer, and through him to headquarters, and are required to make daily written reports to him. He in turn makes similar reports to his superiors, and, in addition, makes various other reports covering the work under his charge. The division engineer also has the making of monthly estimates on the contract work in his division and must make these before contractors can receive payments.

A similar organization obtains in the repair division and in the headquarters of the department. Each official or employee is given certain work to perform and is held accountable for the results. In carrying out the work he is expected to use his own judgment in matters of detail, but to follow the general rules of the department.

Organizations similar in their general features to that in Connecticut may be found in many of the states and counties where there are highway departments and in many of the street departments of cities; yet in some places street and highway work is administered without much attempt at organizing the forces in the same intelligent manner that one would expect to find in a private business. Proper organization is a prerequisite to efficient and economical road betterment, and the subject is one which may very properly be accorded the importance that it will be given at the Philadelphia convention.

Expenditures For Road Building in the Priamur District in Asiatic Russia during 1912 amounted to $341,511, according to figures given by Consul John F. Jewel, of Vladivostok, in a recent issue of the "Daily Consular and Trade Reports." From 1902 to 1906 the total expenditure was $37,884; in 1906 it was $40,114; in 1907, $156,330; in 1908, $149,818; in 1909, $153,970; in 1910, $140,442, and in 1911, $233,686.

Road Work in the New Cemetery at North Arlington, New Jersey

The development of the new cemetery of the Roman Catholic Diocese of Newark, N. J., at North Arlington, which is now nearing completion, has included a large amount of road work. The construction of these roads, involving besides the usual problems of construction, many others incident to landscape architecture, presents points of peculiar interest.

The cemetery comprises a tract of about 200 acres, which, when the work of improvement was started about a year ago, consisted of entirely unimproved land, varying in character from open fields to densely wooded areas. A considerable portion of the tract was formerly covered with large timber which had been cut some time previous, leaving the ground covered with old stumps and thick undergrowth.

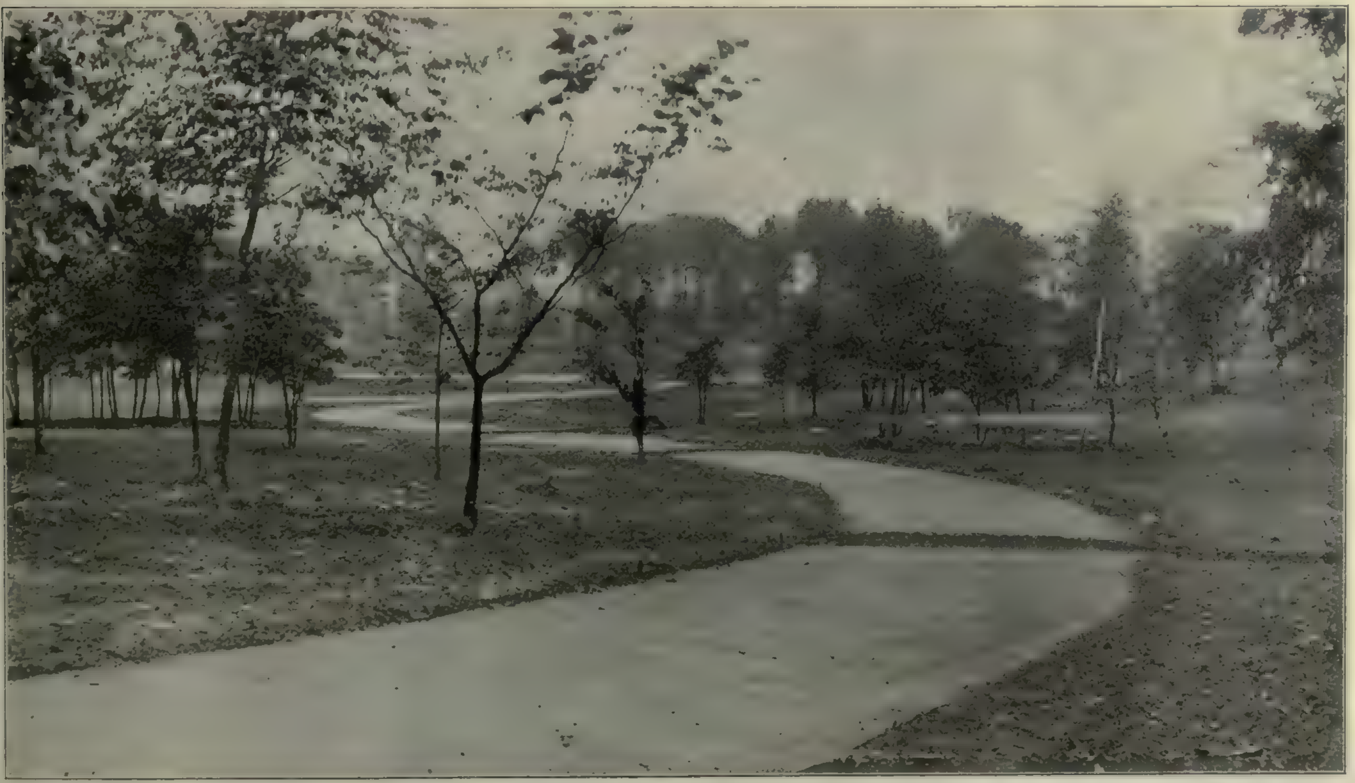
The road work in connection with the development consisted of the establishment of a system of macadam and gravel roads, drives and walks of various widths, and the building of bridges, culverts, drains, curbs, etc. The entire road and walk system was designed and laid out to present a pleasing appearance, and, at the same time, to serve adequately the entire area, affording reasonably direct routes from point to point, with several continuous roads at about equal distances apart. The fact that the entire system was to be built at once, thus eliminating the necessity for making reservations for the future development of adjacent territory, and the absence of existing roads to influence the design, greatly facilitated the work of location. On the other hand, exceptional care was required in laying out curves and establishing grades in such relation to each other as to secure the most pleasing effect when viewed from all points. The maximum difference of elevation in the entire tract is about 80 ft., and when a change of grade occurred on a horizontal curve particular pains were taken to adjust the vertical curve so as to preserve the effect of the horizontal curve.

As it was obvious that the nature of the traffic in cemeteries did not require hard, smooth road surfaces, macadam and gravel roadways were considered adequate. For similar reasons, the width of the main roads was established at 15 ft. and that of secondary roads at 7 ft. The 15-ft. roads are designated as main drives, and, when completed, will have a total length of six miles. They will be of macadam, consisting of 6 ins. of trap rock laid on a subgrade composed principally of broken shale or clay, and surfaced with a light dressing of trap rock screenings.

The secondary roads, intended principally for pedestrians, will have a total length of a little more than four miles. They will be built of natural gravel 3 ins. deep, with a wearing surface consisting of 1 in. of broken trap or screenings to give them the same general appearance as the main drives.

In addition to these roads, there are a few 4-ft. paths, principally along the brook running through the cemetery. These paths are of the same construction as the 7-ft. roads except that there is no top layer of broken trap.

Instead of gutters a system of underdrainage has been installed on the 15-ft. and 7-ft. roads. The drains consist of vitrified clay pipe, 6 to 12 ins. in diameter, laid in cement under the center of the roads at a depth of 4 ft. Catch basins are built at frequent intervals. These drains are for the purpose of taking care of surface water only, and, in



A COMPLETED MAIN DRIVE IN THE NEW CEMETERY OF THE ROMAN CATHOLIC DIOCESE OF NEWARK, AT NORTH ARLINGTON, N. J.

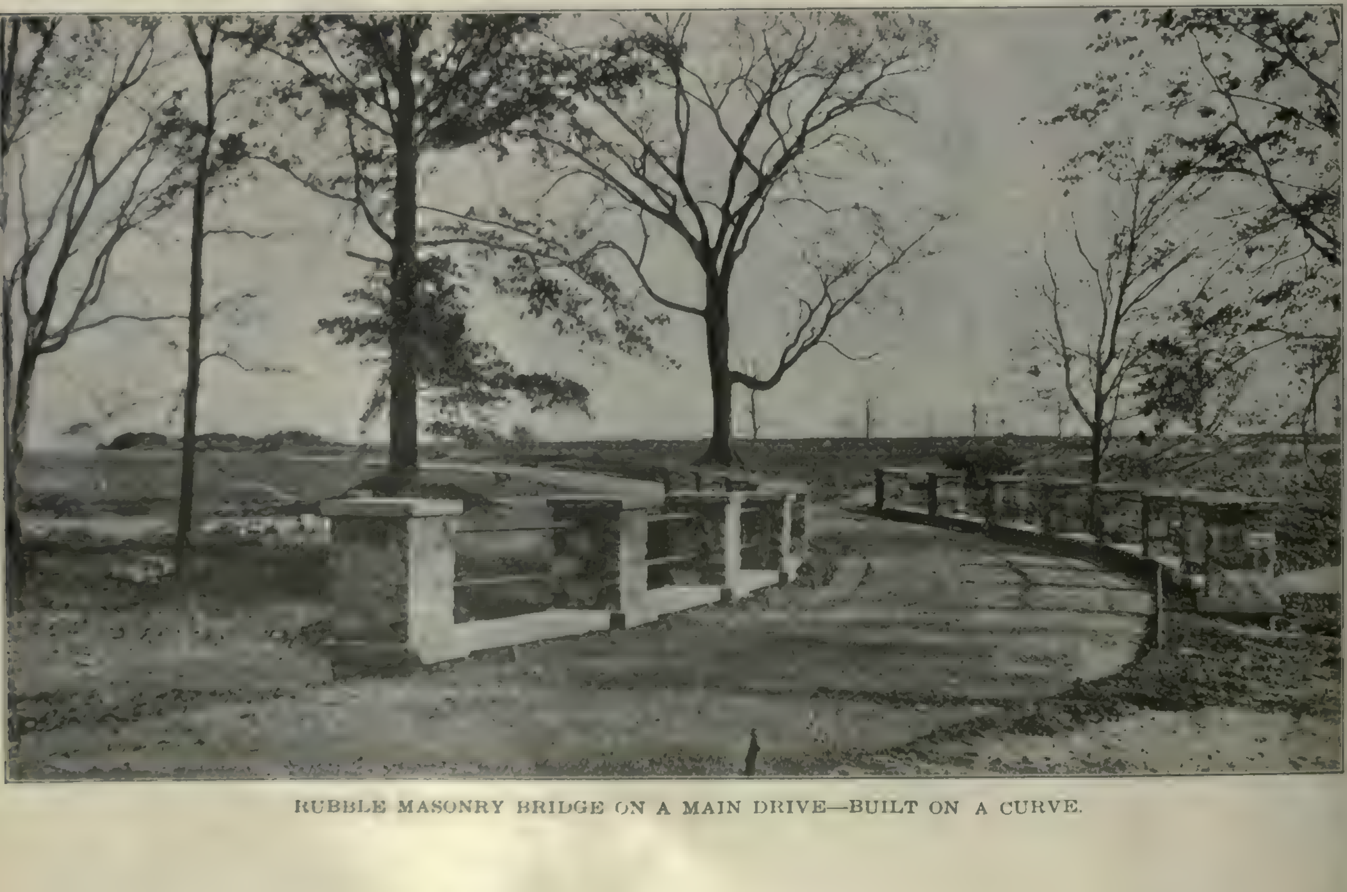
LOADING MOTOR TRUCKS WITH STONE AT THE RAILROAD AT NORTH ARLINGTON.

SPREADING AND ROLLING STONE ON A MAIN DRIVE IN THE CEMETERY.

most instances, lead to the brook. For the deeper draining of the soil, French drains of 6-in. to 8-in. vitrified pipe, surrounded with about 2 ft. of loose stone, are laid from 7 to 10 ft. underground along the banks of the brook. The drainage system was installed instead of gutters both for the sake of appearance and because gutters would occupy valuable land. It was calculated that gutters on both sides of the roads comprised in the system would take up over 150,000 sq. ft. of land, representing a value on which the interest would pay the cost of more repairs than would be likely to be made necessary by the erosion along the edges and on the surface of the roads.

The layout of the roads and drives necessitated the construction of thirteen bridges, eight on the 15-ft. roads and five on the 7-ft. roads. Those on the wider roads are built of concrete or rubble of varying design, and those on the 7-ft. roads have rustic wooden superstructures on rubble abutments. The largest bridge is of rubble construction, 150 ft. long and 20 ft. wide, and is built on a curve.

A topographical map of the tract, showing contours at intervals of 1 ft., was made in September, 1911, a time of the year when conditions for the work were extremely unfavorable, the weeds and undergrowth having reached a maximum height and density. The road locations were then cleared and grubbed, stumps and large trees being removed by dynamite and machinery. Top soil, loam and all organic matter removed from the road areas, were piled for use later in finishing. Catch basins and drains were next in-



RUBBLE MASONRY BRIDGE ON A MAIN DRIVE—BUILT ON A CURVE.

VIEW IN CEMETERY TRACT SHOWING NATURE OF COUNTRY BEFORE DEVELOPMENT.

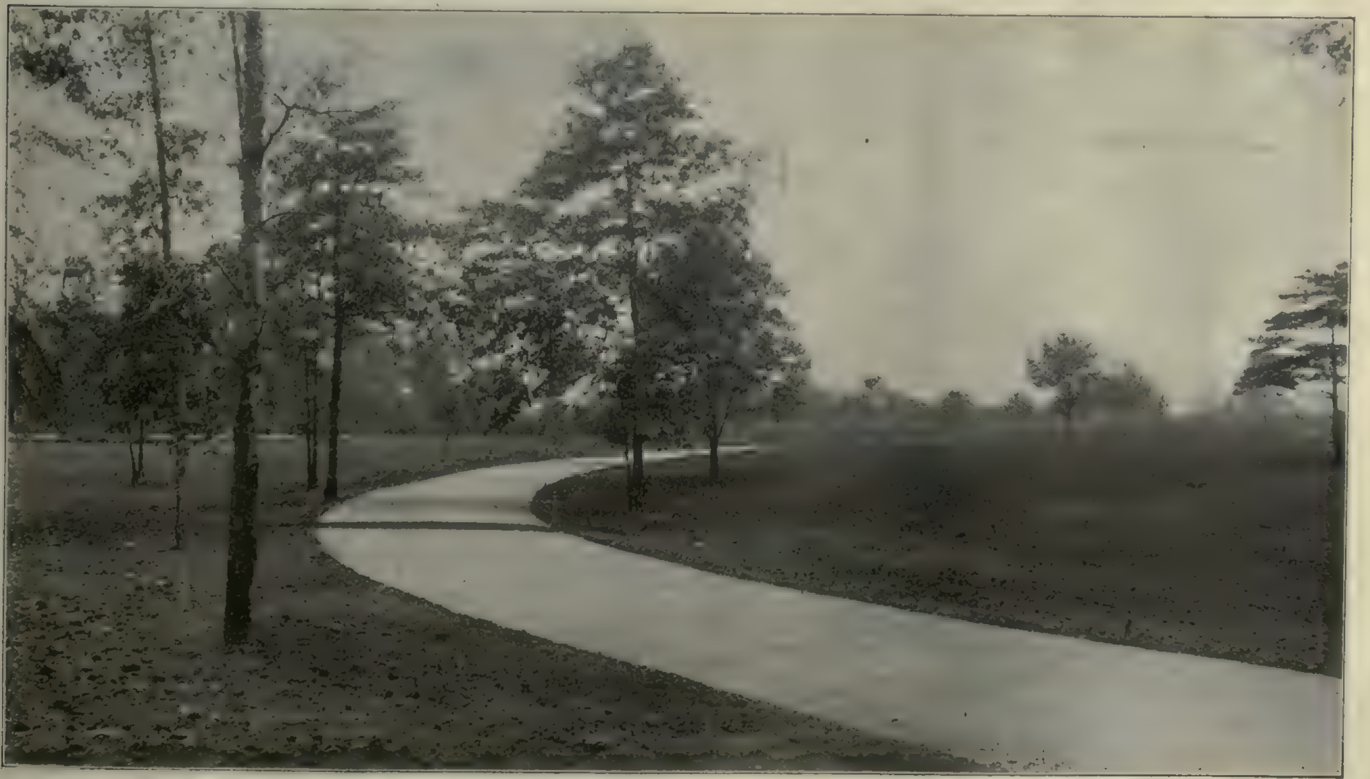
VIEW IN PORTION OF TRACT SHOWN IN ILLUSTRATION OPPOSITE—DURING WORK.

stalled and water pipes for flushing and sprinkling purposes were laid underground along the edges of the roads, and the grading commenced.

In constructing the macadam, the subgrade is finished to the required crown, allowing no variation in the surface of more than ¼ in., and the trap rock is then laid in two 3-in. courses. After rolling the first course it is dressed with binding gravel or trap screenings, and the second course applied. The second course is finished with trap screenings. Strips of sod are laid along the sides of the roads so as to sharply define the edges and also to form borders for the adjacent seeded areas.

Points of curve and tangency are marked for future identification by stone monuments. These are 4 ins. square and 4 ft. long, and are set in concrete 8½ ft. from the center line on 15-ft. roads and 4½ ft. on 7-ft. roads.

The drive or plaza from the main entrance on Kearney Ave. is 100 ft. wide and extends for a distance of about 425 ft. to the point where the general system of roads in the cemetery begins. In the center of this main entrance there has been laid out a series of grass plots 104 ft. long and 24 ft. wide. Roadways 18 ft. wide run along each side of the central plot, the roadways being flanked on the outside by other similar grass plots 10 ft. wide, outside of which are gravel sidewalks 10 ft. wide running between the narrow grass plots and the lawns of the cemetery on each side. The central plots are surrounded by 5-in. granite curbs, and the narrow plots have 5-in. granite curbs on the driveway



PORTION OF CEMETERY SHOWN IN ILLUSTRATIONS AT TOP OF PAGE—ROADS COMPLETED.

A MAIN DRIVE AND A CONCRETE BRIDGE UNDER CONSTRUCTION IN THE CEMETERY AT NORTH ARLINGTON.

edges and 3-in. curbs on the sidewalk edges. The plaza terminates in a rectangular plot 330 ft. wide by 200 ft. deep. A large grass plot occupies the center of this square, a driveway running around all four sides. At all important intersections of 15-ft. roads circular, triangular or square plots for grass and plants have been laid out.

The cost of grubbing and clearing the ground for the entire tract was approximately $6,000. The cost of removing the top soil and preparing the subgrades for the roads was about $10,000, and that of constructing the roads after the preparation of the subgrades will amount to about $45,000. The average cost per lin. ft. of macadam construction on 15-ft. roads is $1.10; that of gravel on 7-ft. roads, 65 cts. and that of the 4-ft. paths 22 cts.

The contract for the development of the tract was awarded to the Fairfield Landscape and Nurseries Co., 103 Park Ave., New York, N. Y., on a bid of about $175,000. The design and plans were made by Otto Sonne, landscape and civil engineer, 132 Nassau St., New York, N. Y., and the work is being done under the supervision of George J. Pearson, president and general manager of the Fairfield company.

COMPLETED DRIVE AND BRIDGE SHOWN IN ILLUSTRATION AT TOP OF COLUMN.

STATE HIGHWAY WORK IN MAINE

Paul D. Sargent, Chief Engineer of the Maine State Highway Commission, has been instructed by the State Highway Commission to prepare specifications and plans for two sections of state highway, one running between the New Hampshire line at Fryeburg and Bridgton, and the other beginning at York Beach and extending 2 miles towards Cape Neddick. The first strip, 7 miles long, will be of earth construction, and bids will be asked for three kinds of construction for the second—gravel, bituminous macadam and concrete.

It is stated that the State Highway Commission insists that the heavy grading and blasting be done this winter, so that the work of surfacing, etc., can be rushed as soon as the weather is favorable in the spring.

Other contracts will be let this fall as fast as specifications can be prepared by the State Highway Department.

BOND PURCHASES FOR THE BUILDING OF THE TEJON PASS ROAD IN CALIFORNIA

Several of the counties of southern California have agreed to purchase blocks of the $18,000,000 bond issue under which the state is building highways for the purpose of financing the construction of a state highway through the Tejon Pass. If present plans are consummated, a through highway will be constructed between Sacramento and San Diego in time for the opening of the Panama Canal Exposition in 1915.

VIEW SHOWING TREATMENT OF PLAZA AT KEARNEY AVENUE ENTRANCE.

Among the counties which have agreed to purchase bonds for road work, together with the amounts, are the following: Imperial, $200,000; San Luis Obispo, $250,000; Marin, $90,000. These purchases will be contingent upon the expenditure by the California Highway Commission of similar sums already available.

The question of taking up the bonds in order to hasten road construction is being considered in Santa Clara, Tuolumne, Alameda and Calaveras Counties.

Plans for a Proposed New Road, between Savannah and Tybee, in Chatham County, Ga., call for the construction of four steel drawbridges at an estimated cost of approximately $250,000.

Premilinary Plans For a Scenic Highway through the Minnesota Valley in Minnesota have been practically completed. The contract for the work will be awarded soon. The highway will be constructed with Minnesota's share of the $500,000 recently appropriated by Congress for federal aid in the construction of post roads. The work of preparing the plans has been in charge of J. C. Wunder, Senior Highway Engineer, U. S. Office of Public Roads.

The Detroit Road Congress

A convention designated as the Third American Road Congress was held at Detroit, Mich., during the six days beginning Monday, September 29, under the joint auspices of the American Highway Association, the American Automobile Association and the Michigan State Good Roads Association, and was participated in by a number of other organizations consisting for the most part of local good roads associations. The meeting was the third of a series of conventions in the holding of which the American Highway Association has been the principal factor, the first being held at Richmond in 1911 by that association alone, and the second at Atlantic City in 1912 by the American Highway Association, the American Automobile Association and the National Association of Road Machinery and Material Manufacturers. The congress was held at the Wayne Gardens. the meetings in the hall on the second floor and the exhibits of road machinery and materials on the lower floor and in tents adjacent to the sides of the building.

The morning and afternoon sessions on Monday, the morning session on Wednesday, part of the session on Wednesday afternoon and the session on Saturday were under the auspices of the American Highway Association. The session on Tuesday forenoon and the sessions on Thursday were under the auspices of the American Automobile Association. The session on Tuesday afternoon was held under the auspices of the American Bar Association, and the finance session on Wedneday afternoon under the auspices of the American Bankers' Association. On Friday, both the morning and afternoon sessions, comprising the sixth annual convention of the Michigan State Good Roads Association, were held under the auspices of that organization. Besides these sessions there was a meeting on Wednesday evening, designated as "manufacturers' evening," and on Thurday evening the American Highway Association held its annual business meeting.

Monday, September 29

The first session of the congress was called to order at 11:30 a. m., Monday, Sept. 29, by Logan Waller Page, President of the American Highway Association and of the congress. After Dr. Joseph A. Vance, Pastor of the First Presbyterian Church of Detroit, had pronounced the invocation, Chas. B. Warren, First Vice President of the Board of Commerce of Detroit, welcomed the delegates on behalf of the city for Mayor Oscar B. Marx, who was unable to attend. During his address Mr. Warren called attention to the relation of the motor car industry to road building and referred to the subject of national aid and to the Lincoln Highway Association project. President Page then read the following letter from President Woodrow Wilson:

"My dear Mr. Page:—May I not convey, through you, to the members of the American Road Congress, which is to assemble in Detroit, my sincere regret that I cannot be present and express, at least, the very deep interest which I feel in the whole matter of adequate road building in the United States. Every man who wishes to see this great country made the most of must sympathize with the efforts now being made to weave its parts together by good roads. Please present my cordial greetings to the congress."

Other letters of a similar character were read from Attorney General McReynolds, Postmaster General Burleson, Secretary of the Navy Daniels and Secretary of the Treasury McAdoo.

After the reading of these letters, President Page's address was read by Philip T. Colgrove, President of the Michigan State Good Roads Association. After referring to the amount expended for road work in this country, Mr. Page said that at present the nation stood on the threshold of federal aid in road improvement. Referring to the previous activity of the nation in this work, he said that the conditions of today demanded the rapid development of highways; that the automobile had revolutionized traffic conditions; that electric railway lines had brought the country into close touch with the cities, and that public highways were no longer local matters but great national assets and great national liabilities. "There is a great opportunity to turn into a farce this movement for good roads," he said, "and to seriously hamper our efforts." He held that we should think carefully before engaging in any activity bearing the stigma of political expediency. President Page also quoted statistics showing that during the past year the people of the United States had spent $316,000,000 in moving picture shows and said that if we could afford to spend that amount for the gratification of a whim he did not believe $500,000,000 a year too great a sum to be devoted to good roads. He also condemned the practice of issuing long term bonds, the building of extravagant roads and the failure to provide proper maintenance. He said that bonds should not outlive the roads for which they were to pay and that it was almost criminal to issue 50-year bonds for roads that could last only five years. He also referred to the necessity for eliminating antiquated legislation and for securing proper laws.

Other addresses at the morning session were made by Chairman A. G. Batchelder of the Executive Committee of the A. A. A., who took the place of President Laurens Enos of that association who was not present; by Judge J. M. Lowe, President of the National Old Trails Road Association, and by Col. Wm. DeH. Washington of the Board of Consulting Engineers of the New York State Highway Commission.

The session on Monday afternoon was called to order at 2:45 p. m. by President Page, who introduced Secretary of Agriculture David F. Houston, the principal speaker of the afternoon. Secretary Houston said that the problem of rural life was one of the most important which we had and that as compared with urban life rural life was unsatisfactory. Pointing out the advantages of living in the city, he said that these were the results of organization and cooperation and that there was no reason why, with intelligence, the disadvantages of country life could not be removed. He held that it was time to deal with the question by other than individualistic effort and that good roads were prerequisites for most of the improvements which could be made. He then referred to the work of the Department of Agriculture in connection with roads and its activity in investigative and educational work in that line since 1893 and reviewed the development of the Office of Public Roads. Characterizing as a step of great importance and significance the appropriation of $500,000 by congress to be expended by the Secretary of Agriculture in cooperation with the Postmaster General for the improvement of certain roads, he pointed out that by this the Department of Agriculture had been charged with the supervision of an expenditure for roads of about $1,750,000.

Referring then to the increase in the expenditures for roads in the past ten years, Secretary Houston said that no one questioned that the states and the localities should largely contribute to the support of roads, and that the main questions for consideration were those of the extent and character of such aid and of the methods and machinery—federal, state or local. He said that the first essential in the planning of road legislation would seem to be to recognize the state as the smallest unit with which the federal government might deal, and that many of the states had efficient state highway departments, thus affording organizations with which the government could cooperate. It would seem, according to Secretary Houston, that the basic feature would be such cooperation between the states and the federal government as would leave the former the initiative in selecting roads to receive aid and also as much of the work of construction and maintenance as would be practicable. He held that in the case of roads on which federal money was expended it would seem wise and essential that the federal government should have the power of approving the selection and supervising the construction and maintenance, and that it should have the right of inspection for the purpose of seeing that the federal money was applied to the purpose for which it was voted and that it was efficiently expended.

"There may be those," he said, "who will 'view with alarm' any suggestion that the federal government cooperate with the states financially in road building and more especially that it exercise an adequate measure of control and supervision even over the expenditure of its own funds." He pointed out that the cry of centralization might be raised, but asked what could be more natural than cooperation and mutual assistance in a field of common interest and of inseparable activities. "Why," he asked, "should the two jurisdictions serving the same people forever stand apart and view each other with suspicion and distrust while nothing is done or much is wasted?" He pointed out that this alarm never seized upon people at the stage of discussion when it would be of the most value, and that they were not in the least timid in their approaches to the federal treasury, their courage failing them only when it was suggested that the federal government had a right to see that the money of the people of the nation was wisely and efficiently expended. "If they are to take counsel of their alarms," he said, "let them do so before they determine to assault the treasury."

Secretary Houston held that the matter was one in which haste could best be made slowly and that the people would sanction a reasonable expenditure of their money when they were convinced that it was applied to a wise purpose and would yield the results anticipated. He said that he was impressed by the wisdom of Congress, in the midst of so much clamor, in constituting a committee of inquiry and making an appropriation of $500,000 to be expended in cooperation with the states and in requiring the Secretary of Agriculture and the Postmaster General to report to it the results of the expenditure. In closing, he said:

"To summarize, it seems to me that if federal help is to be extended to the building and improvement of roads, it should follow, approximately, these lines:

"First, it should require the cooperation of the state in a larger measure in financial support and in construction and maintenance.

"In the second place, it should be understood that the federal government should have adequate supervision and control over the enterprise in each community and guarantee the efficient expenditure of its own funds.

"In the third place, the federal commissioner should deal exclusively with efficient agencies provided and supported by the states.

"In the fourth place, the plan should provide for the apportionment of funds among the states on the basis of certain essential factors; and

"Finally, the primary undertaking should be to improve those community roads which are essential for the marketing of products and for the betterment of the physical, intellectual and social side of rural life."

A. W. Campbell, Deputy Minister of Railways and Canals of Canada, followed Secretary Houston. In the course of his remarks, Mr. Campbell called attention to the relation between wagon roads, railroads and water roads, emphasizing the dependence of rail and water transportation upon roads. He outlined briefly conditions in Canada, touching upon some of the problems necessary to be solved in their prosecution of road work. Among these were the necessity of looking after secondary roads as well as the more important ones; the necessity for maintenance, and the building of roads of adequate strength.

Col. Wm. D. Sohier, Chairman of the Massachusetts Highway Commission, spoke next on "The Roads of England and France." A part of Col. Sohier's paper was devoted to the International Road Congress at London and the resolutions adopted at that meeting. In referring to the roads in France and England, he said that we must recognize the amount of money and time which would be required to bring this country to the position held by those countries, where their roads had been built for years and their whole problem was one of maintenance. After giving statistics of the mileage of roads and the expenditures made on them in France, he said that to secure such a road system in Massachusetts, with its 23,000 miles of road, would mean years of work and the expenditure of more than $100,000,000—that it would mean the expenditure of at least $5,000,000 a year for the next 20 years to build the trunk lines and secondary roads alone.

The most important lesson that France could teach us, he held, was that we should secure proper locations for our roads and sufficient width for all future requirements. He said, also, that although France undoubtedly had the best road system in the world so far as location, layout, foundation and drainage were concerned, where there was much motor vehicle travel the macadam roads were going to pieces just as fast as our water bound macadam roads had gone to pieces since the advent of motor travel. He said that one noticeable thing in both England and France was that except near cities, not 10 per cent. of the number of motor vehicles were encountered that were usually met in this country, at least in the eastern states. This, according to Commissioner Sohier, accounted for the good condition in which their water bound macadam roads had remained. He also spoke of the French patrol system of maintenance, of the drainage ditches employed in France and of the French practice of making the crown flatter than it is made in this country.

In referring to English roads, he gave statistics of expenditures, calling attention to the method of securing funds from a tax of 6 cts. per gal. on gasoline and from the large motor vehicle license fees. Col. Sohier said that what was particularly noticeable in connection with English traffic was the large number of traction engines and trailers hauling from 8 to 10 tons on iron tires. He said that he understood that this traffic rapidly cut through and destroyed any macadam road less than 5 ins. in depth, and that so far as he could learn the engineers were now building most of the heavily traveled main roads of at least 9 ins. of macadam, the top 3 ins. being bound with bitumen. The location of the English roads, according to Col. Sohier, was inconceivably bad, the roads being very narrow and the corners very blind; the surfaces, however, were almost uniformly good, except near the cities, where the motor traffic was heavy. It was his opinion that we could learn a great deal from the English in the matter of maintenance and he gave statistics of maintenance expenditures in that country. He also discussed methods of resurfacing in France and England and the character of English tars, which, he said, seemed much more lasting, more elastic and stickier than those in this country.

In conclusion, he said that though he would not discourage any "good roads" movement in this country it was necessary to go at it in a proper and scientific manner—to know what the problem was and then to proceed in a businesslike way. He said that it was necessary to realize the enormous amounts of money involved and also realize that it required education, skill, intelligence and experience; but expressed the belief that we had engineers in this country that could do as good work as anyone abroad. He emphasized the necessity for constant maintenance; for providing the money for that purpose as well as for construction if we were not to find that the bonds issued to build our roads still remained to be paid when the roads had long since passed away, and for cooperation upon a carefully prepared plan made by competent engineers after a full study of the whole problem.

The last address of the morning was made by Frank W. Buffum, State Highway Commissioner of Missouri, who spoke on "The Missouri Plan." Commissioner Buffum said that the highway laws of Missouri were deficient in many respects, and told of the establishment of the State Highway Commission. Referring to the "good roads days" held in Missouri in August, he said that the results of the work were a surprise even to its promoters and the designation of "good roads days" for the future would be provided for by law at the next Legislature. After explaining the Missouri highway laws, he said that one of the most beneficial was that known as the "county seat to county seat dragging law," which provided for the dragging of about 12,000 miles of road.

From 5 to 7 p. m. on Monday a reception in honor of Secretary Houston and Deputy Minister Campbell was given by the Board of Commerce of Detroit at the new building of the board at 64 Lafayette Boulevard. In the evening a subscription banquet in honor of the distinguished guests at the congress was held at the Hotel Pontchartrain. Geo. T. Moody, former president of the Board of Commerce acted as toastmaster, and among the speakers were Deputy Minister A. W. Campbell; Mayor Oscar B. Marx of Detroit, Geo. C. Diehl of the good roads boards of the A. A. A.; J. O. Reaume, Minister of Public Works of Ontario; Representative Wm. P. Borland of Missouri; Col. Wm. D. Sohier, Chairman of the Massachusetts State Highway Commission; Judge Roland Baggot of Dayton, Ohio, and Wm. Livingstone, President of the Lake Carriers' Association.

Tuesday, September 30

The "national legislation session," held under the auspices of the American Automobile Association, was called to order shortly after 10 o'clock on Tuesday morning by Geo. C. Diehl, chairman of the good roads board of the A. A. A. Chairman Diehl introduced as the first speaker Representative Dorsey W. Shackleford of the eighth district of Missouri. After calling attention to the value of roads and to what had been accomplished in road building in this country, Congressman Shackleford stated that it was generally conceded that the federal government had authority to construct and maintain roads used for federal purposes but that to what extent the power could be exercised was a question which would severely tax statesmanship to answer. He said that it was primarily the duty of the states to provide their inhabitants with roads and that it would be a long step backward if congressional legislation should afford the states any means for avoiding this fundamental obligation. On the other hand, to provide an adequate system of roads imposed a heavy burden on the taxpayers of the state, and he said that it was no more than justice that the federal government should contribute to the upkeep of the roads which it used in the performance of federal functions.

Congressman Shackleford said that it could not be doubted that an overwhelming majority of the people wanted federal road legislation, but that unfortunately they differed radically as to what such legislation should provide. We were divided, he held, into two general classes, which he designated as the "touring roads" class and the "business roads" class, the first being made up largely of rich automobile owners, and the second of those who believed that in dealing with roads the functions and the relation they bear to the general transportation system of the country should be kept in mind. Representative Shackleford said that the "touring roads" advocates had two plans by which they hoped to secure the roads they desired, the favorite one being the construction of national roads by the federal government and the alternative being the construction of a limited mileage of "across country" roads jointly by the federal government and the states. He said that under both plans the primary purpose was to get touring roads. He then took up these two plans for national roads, severely criticizing them on the ground of impracticability and failure to serve the general public adequately. He said that it was not a road nor yet a few roads that we wanted, but that we must have a general system of good roads extending throughout the length and breadth of the land.

In closing, Congressman Shackleford pointed out the excellent work which had been done in the various states and the desirability of having road construction under the charge of local authorities acquainted with the conditions. But he held that the federal government should contribute to the upkeep of such roads as were used for federal purposes and that Congress should provide general standards of roads for which contributions would be made. He said that the government could then protect itself by inspection and by refusal to make payments for roads falling below such standards and that such roads would require but little federal machinery for administration. In the last Congress, according to Congressman Shackleford, a bill had been passed by the House providing for a yearly contribution to each mile of road in the states, which should be constructed and maintained according to the specified standards. The bill had failed in the Senate, but had it become a law, it was his opinion that in one year it would have given the country 50,000 miles of good roads and in five years would have given a million miles.

Representative Shackleford was followed by Edward H. Butler, publisher of the "Buffalo Evening News" of Buffalo, N. Y., who spoke briefly favoring federal aid. He held that the efforts of rich motor car owners to obtain transcontinental highways would aid the poor farmers and would benefit many sections of the country by bringing to them travelers who would spend their money in those sections and develop them.

Congressman Wm. P. Borland of the fifth district of Missouri was the next speaker. Although advocating no plan for state aid that was specific in its details, he disagreed with the views expressed by Congressman Shackleford and declared that the bill passed by Congress appropriating money for federal aid had resulted in a "glittering failure," though this outcome was not the fault of the Secretary of Agriculture nor of the Postmaster General. He said that out of 48 governors who had been invited to select a road for improvement only 12 had done so, the rest reporting that the state laws were in such shape that they could not make the selection, and that of the 12 states in which roads were designated, only three—Alabama, Mississippi and Oregon—could accept the allotments made to them.

In speaking of the value of roads to the farmers, he said that more automobiles were owned by them than by any other one class in his own district, where there was an excellent highway system. He said that if roads were purely local there was no justification for federal aid in any form, but he held that all roads were not local in character and that in any plan of federal participation in road building the national government should deal directly with the states. It was his opinion that the federal government and the state governments should jointly approve routes and that there must be active cooperation between the nation and the local units in road construction.

After Representative Borland's address, Chairman Diehl announced the appointment of the resolutions committee. This committee, as named by President Page, consisted of one member from each state at that time represented in the congress and consisted of the following: Alabama, W. S. Keller, State Highway Engineer; Arkansas, Judge Joseph Asher; Arizona, Judge T. G. Norris; California; A. B. Fletcher, State Highway Engineer; Colorado, A. J. Lawton, Commissioner of Public Works, Colorado Springs; Connecticut, James H. MacDonald, former State Highway Commissioner; District of Columbia, Charles P. Light, Field Secretary American Highway Association; Delaware, J. D. Bancroft; Georgia, Professor C. M. Strachan, Dean, Engineering Department, University of Georgia; Illinois, A. N. Johnson, State Highway Engineer; Indiana, C. A. Kenyon, President, Indiana Good Roads Association; Iowa, Professor T. H. MacDonald, State Highway Engineer; Kansas, W. S. Gearhart, State Highway Engineer; Louisiana, W. E. Atkinson, State Highway Engineer; Maine, Lyman H. Nelson, Chairman, State Highway Commission; Maryland, R. Keith Compton, Chairman, Paving Commission, Baltimore; Massachusetts, L. R. Speare, former President, A. A. A.; Michigan, P. T. Colgrove, President, Michigan State Good Roads Association; Minnesota, Geo. W. Cooley, State Engineer; Missouri, Major Frank W. Buffum, State Highway Commissioner; Montana, William Jordan, Jr., City Engineer, Helena; Nebraska, G. E. Parisoe, Secretary, Omaha-Lincoln-Denver Road Association; New Hampshire, S. Percy Hooker, State Superintendent of Highways; New Jersey, A. G. Batchelder, Chairman, Executive Committee, A. A. A.; New Mexico, Francis E. Lester, President, State Association of Highway Officials; New York, Geo. C. Diehl, Chairman, Good Roads Board, A. A. A.; North Carolina, Dr. Joseph Hyde Pratt, State Geologist; Ohio, L. M. Brown; Oklahoma, Col. Sidney Suggs, State Highway Commissioner; Oregon, J. R. Penland; Pennsylvania, John A. Wilson; Rhode Island, John A. Richmond, Member, State Board of Public Works; South Carolina, W. P. Cantwell, County Supervisor, Charleston; Tennessee, Dr. J. D. Henderson; Texas, Judge Albert S. Eyler; Utah, Richard R. Lyman, Vice Chairman, State Roads Commission; Vermont, J. W. Votey, Dean, Engineering Department, University of Vermont; Virginia, Captain P. St. J. Wilson, State Highway Commissioner; Washington, M. Roy Thompson, County Engineer, Tacoma; West Virginia; Geo. B. Chorpening, Member, State Roads Commission; Wisconsin, A. R. Hirst, State Highway Engineer; Wyoming, A. J. Parshall, State Engineer; Canada, Hon. A. W. Campbell, Deputy Minister of Railways and Canals. Mr. Diehl was the chairman of the committee.

The next speaker was Chas. Thaddeus Terry, Chairman of the National Legislative Board of the A. A. A. Mr. Terry said that it was time that talk ripened into some concrete thing; that if it didn't it would rot. He said that everyone was for good roads, but that the question was how to get them, and emphasized the fact that it was necessary to go to Congress with some definite plan. He explained in detail the plan proposed by Jonathan Bourne, Jr., and urged its adoption, offering a resolution that the Bourne plan be advocated by the association.

The last speaker of the session was James H. MacDonald, former State Highway Commissioner of Connecticut, who was scheduled to speak at the afternoon session on Monday on the subject "Road Development in Connecticut." In the course of his address, Mr. MacDonald said that the talk about the excellency of foreign roads was not borne out by all the facts in the case; that American engineers had nothing to learn from European engineers, and that there were just as fine roads here as abroad. He said that 15 miles beyond the boundaries of Paris one sat in an automobile with difficulty, and it was his opinion that if the people of the Old World had been transferred to this they would not have made as good a showing as had been made here. Mr. MacDonald also referred to the progress made in road construction in Connecticut, laying special emphasis upon the growth of the work.

The Tuesday afternoon session, on state road legislation and management, was held under the auspices of the American Bar Association, and was called to order at about half past three by Frederick D. Wadhams of Albany, N. Y., who presided. Secretary John T. Doyle of the U. S. Civil Service Commission spoke first, his topic being "The Merit System in Road Administration." He held that in road work the merit system was essential inasmuch as the roads constituted a great transportation system which should be administered with the same skill and efficiency as if it were in the control of a private corporation. Instead of that, according to Mr. Doyle, there are a thousand or more local road officials, most of them elected and very few of them required to have very much knowledge of road construction and to give any considerable time to the work. He cited many instances of the merit system in federal, state and city governments and pointed out its advantages and the actual results which had been accomplished by it, and closed with a plea for the adoption of the system by state and city governments generally. He said that there was a widespread demand that the people be efficiently served by the honest and intelligent administration of common affairs and that if the local authorities did not meet this demand there would be increasing centralization of the government of the country.

The next speaker was J. E. Pennybacker, Secretary of the American Highway Association, who presented a paper entitled "A Plan for Simplifying Road Legislation in the States." He suggested that the congress appoint a committee to carry to the governors and legislatures of states a proposal that they codify and simplify the road laws through state commissions. He proposed, further, that the results be brought before an interstate commission in order to get at fundamental principles applicable in all states. Mr. Pennybacker said that road legislation in the various states had grown piece by piece and that it was almost impossible for even a student of laws to ascertain what laws were in effect in his own state. The bane of road work in the United States, according to Mr. Pennybacker, has been politics.

The next speaker was A. H. Houston, chairman of the committee for revising the road laws of Ohio. Mr. Houston spoke briefly on the work done by the committee, emphasizing the need for uniformity in road laws.

At the close of Mr. Houston's remarks, Mr. Pennybacker spoke again, urging the appointment of a committee of five on uniform road legislation to confer with the corresponding committee of the American Bar Association. The meeting finally voted for the appointment of such a committee by President Page. The next speaker was Chas. Thaddeus Terry of the national legislative board of the A. A. A. He said that one trouble of the dual system of government in this country was the lack of uniformity and that this was nowhere greater than in the automobile and road laws. He held that the laws should be uniform, and spoke of the work done by the American Bar Association's committee and that of the Conference of Commissioners on Uniform State Laws.

The last speaker of the afternoon was Clarence A. Kenyon, President of the Indiana Good Roads Association, who also spoke on the necessity for uniform road laws. He said that the question of uniformity in laws had attracted more attention than any other at the London road congress, and referred to the conclusion adopted by that congress to the effect that in every case the unit of administration should be large enough to furnish adequate money and a sufficient engineering force to carry out the work. Mr. Kenyon cited the extreme localization of road administration in Indiana as an example of the violation of the principle of making the unit sufficiently large.

Wednesday, October 1

The construction and maintenance session was called to order shortly after 10 o'clock on Wednesday forenoon by State Highway Engineer A. N. Johnson of Illinois, who acted as chairman in place of Col. E. A. Stevens, State Highway Commissioner of New Jersey, who was not present. The program for this session included seven technical papers, of which six were each to be followed by a discussion opened by one especially selected speaker and then thrown open to the meeting. The schedule for this session included papers and discussions as follows:

Paper, "Unsurfaced Roads," by W. S. Keller, State Highway Engineer of Alabama; discussion opened by Geo. W. Cooley, State Engineer of Minnesota.

Paper, "Gravel Roads; Their Construction, Maintenance, Cost and Special Treatment," by S. Percy Hooper, State Superintendent of Highways of New Hampshire; discussion opened by Leonard Tufts, of Pinehurst, N. C.

Paper, "Treatment of Worn-out and Raveled Macadam Surfaces'" by Col. E. A. Stevens, State Highway Commissioner of New Jersey; discussion opened by Robert C. Terrell, State Commissioner of Public Roads of Kentucky.

Paper, "Bituminous Macadam; Construction and Maintenance," by S. D. Foster, Chief Engineer of the Pennsylvania State Highway Department; discussion opened by W. A. McLean, Chief Engineer of Highways and Commissioner of the Ontario Public Roads and Highways Commission.

Paper, "Drainage Structures," by A. R. Hirst, State Highway Engineer of Wisconsin; discussion opened by Prof. T. H. MacDonald, State Highway Engineer of Iowa.

Paper, "Brick Roads," by James M. McCleary, Road Engineer of Cuyahoga County, Ohio; discussion opened by R. Keith Compton, Chairman of the Paving Commission of Baltimore, Md.

Paper, "Selection of Road Materials," by Logan Waller Page, Director, U. S. Office of Public Roads.

This program was carried out as scheduled with a few exceptions. State Highway Commissioner E. A. Stevens of New Jersey not being present, his paper was not read. The discussion, however, was opened by Commissioner Terrell, according to program. A paper entitled, "Development and Maintenance of Highways in Allegheny County, Pennsylvania," which had not been included in the program, was presented by John S. Gillespie, Road Commissioner of Allegheny County. The discussion on the paper entitled "Bituminous Macadam; Construction and Maintenance," presented by Chief Engineer Foster of the Pennsylvania State Highway Department, was opened by A. D. Gash, President of the Illinois State Highway Commission, instead of by Commissioner W. A. McLean of Ontario. In general, the papers were summarized briefly by their authors, after which the speaker opening the discussion was allowed ten minutes. The discussion was then thrown open, each delegate desiring to speak from the floor being limited to two minutes. It was the intention of those in charge of the congress to have the papers printed in advance of the meeting and distributed to the delegates in order to permit discussion without the reading of the entire paper. Most of the papers were printed and distributed as planned.

Some of these technical papers are printed in full or are abstracted in this issue and others will be given attention in the issue of Dec. 6.

After the presentation of the formal papers, brief addresses were made by Will P. Blair, Secretary of the National Paving Brick Manufacturers' Association, who spoke on the selection of road materials and the methods of constructing brick pavements; Judge Joe Asher of the Little Rock (Ark.) Board of Trade, who discussed the district system in vogue in Arkansas; A. C. Jackson, President of the Illinois State Highway Association; "Colonel" Jeff Davis, President of the International Itinerant Workers' Union, who is generally known as "The Hobo King," and others.

The afternoon meeting on Wednesday consisted of three parts—the contract session, the finance session and the economics session. The first of these, the contract session, was called to order at 3 o'clock by J. R. Wemlinger, Secretary of the American Society of Engineering Contractors, who presided over the session. The first speaker was Wm. L. Bowman, Civil Engineer and Attorney-at-Law, New York, N. Y., who presented a brief summary of his paper entitled "Legal Suggestions Respecting Road Building Contracts."

The word "contract," according to Mr. Bowman, should mean an agreement enforcible by law, but many state contracts for road construction, he said, were not really contracts because of the inability of the contractor to sue thereon. He enlarged upon this feature of contracts, pointing out the lack of protection for the contractor and also denouncing the frequent clauses in contracts providing that work must be done to the satisfaction of some official, some board, some engineer, or all three. He said that in looking over many of the latest forms of contracts for road construction it was noticeable that there was a very decided improvement in the manner and method of setting forth the contract work and specifying what is variously designated as alteration, additional, miscellaneous or extra work. Road work, he said, is now generally specified in various units and a price bid for each respective unit. He urged the general adoption of definite contract units of work at unit payments clearly specified and the making of provision for payment of other work either at the unit prices or upon a percentage basis. Mr. Bowman also discussed at length the duties of the engineer in connection with contract work, and stated the general legal principles which should govern the actions of officials and engineers. In closing, he proposed a set of rules for the guidance of contractors in undertaking contracts. The discussion on this paper was scheduled to be opened by ex-Mayor J. M. Head of Nashville, Tenn. Mr. Head was not present but had sent a paper which was read by C. A. Kenyon of Indianapolis. In the paper Mr. Head described the growth of the contract system and of the development of the laws relating to methods of assessing the cost of work, etc.

The last paper of the contract session, "The Protection and Upkeep of Road Equipment," was presented by Daniel J. Hauer of New York, N. Y., who, like the other speakers, briefly summarized his paper instead of reading it. One of the points made in Mr. Hauer's paper was that for road work a much larger equipment in proportion to the value of the work is required than is needed in other work. As an example of this, he cited a case in which he had built a section of railway costing about $100,000 with a plant costing only about $5,000, while a contract amounting to less than $50,000 for the construction of a wagon road required an outfit costing nearly $20,000. Mr. Hauer also emphasized the need of proper care and upkeep of equipment and the selection of the most approved and economical types.

After the presentation of Mr. Hauer's paper, the contract session was adjourned and Chairman Wemlinger surrendered the chair to President A. D. Gash of the Illinois State Highway Commission, who presided over the finance session. The program for this session included the presentation of three papers as follows: "Financing Road Improvement," by Wm. G. Edens, President of the Illinois Highway Improvement Association; "Bond Issues for Road Improvement," by S. E. Bradt, Vice President of the First National

Bank of De Kalb, Ill., and "Highway Accounting With Especial Reference to Maintenance," by Halbert P. Gillette, Editor-in-Chief, "Engineering and Contracting." Messrs. Edens and Gillette not being present, their papers were not presented, and the only paper which came before the meeting was that by Mr. Bradt.

In the early part of his paper Mr. Bradt stated that while the importance of road financing had always been recognized the underlying principles had been but little discussed. Good public policy, according to Mr. Bradt, demands that money for public work should not be borrowed unless there is urgent need for the improvement; unless the improvement will cost so much that it can not be paid for through the regular method of taxation, or unless the improvement will be sufficiently permanent so as to give full value to those called upon to pay the indebtedness. Taking up these three conditions in their order, he discussed each one in detail. In considering the need for improvement, he gave statistics of the cost of transportation showing the need of improved highways to reduce the cost of hauling. He also quoted census figures showing the distribution of population and the necessity for highway improvement for the development of social life, school life and religious welfare. He referred to the demand for roads manifested by the people by their work to secure them through individual effort and through the promotion of organizations of various kinds. Other points mentioned by Mr. Bradt to illustrate this demand for better roads were the attitude of the press, the introduction of bills into Congress and the growing use of motor vehicles.

In considering the second point, the magnitude of the project, Mr. Bradt quoted statistics of road mileages and the cost of improving the roads, and then took up the question of administration of road affairs. After tracing the progress of road legislation, he said that the time was now ripe for the federal government to undertake road work and suggested that if all the associations working for federal aid could unite in asking Congress to authorize a commission to make a thorough investigation of the subject, the work would soon be under way. If the revenue of the government should require it, bonds should be issued for the construction of our highways, he held, and submitted figures showing the amounts involved.

In regard to the third requirement, that the improvement should be sufficiently permanent to give full value to those who would be called upon to repay the indebtedness, he referred to the practice of issuing bonds for longer terms than the life of improvements and said that it was his opinion that this had often been done because of a lack of correct information as to the durability of the work for which the bonds were issued rather than because of a desire to impose a burden upon those who would have to pay the cost. He held, however, that we are at present in a position to judge sufficiently of the traffic requirements for the next twenty years so as to be able to build roads to meet these requirements, and that this being true it followed that since the coming generation is to share the benefits of the roads it should also share in the cost, which could be brought about only through the issuing of bonds.

The presentation of Mr. Bradt's paper was followed by considerable discussion on bond issues. One delegate stated that the farmers were generally willing to be assessed but were not willing that the roads should be maintained from the proceeds of additional bond issues when the roads were used by heavy tractors. Another delegate, a Michigan farmer, stated that while he was willing to pay his share he did not want to pay interest on bonds. He said that there was no more reason for issuing bonds for roads than for issuing bonds for the running expenses of the state. Mr. Bradt replied that he advocated bonds only for the life of the improvement and did not advocate bonds for maintenance.

At this point, Chairman Gash relinquished the chair to Dr. Jos. Hyde Pratt, State Geologist of North Carolina, who presided over the economics session. In his introductory remarks, Dr. Pratt said that the engineer should have authority over the manner in which money was expended—that is, over the location, construction and maintenance of highways. The type of road, he held, should be governed by the traffic going over it. He also called attention to the fact that a road was not permanent and would need constant repair and maintenance, while the location, on the other hand, was permanent if it had been made by a competent engineer.

The paper entitled "Systematizing the Purchase of Road Materials and Equipment," by Henry G. Shirley, Chief Engineer of the Maryland State Roads Commission, was not read, Mr. Shirley being absent.

The first paper brought before the meeting was "The Labor Problem in Road Construction," by Capt. P. St. J. Wilson, State Highway Commissioner of Virginia. Mr. Wilson's paper consisted of a review of the labor situation in his state and an account of the utilization of convict labor in road building in Virginia. He said that the use of convicts furnished the nearest solution of the common labor problem that had been found in his state. The discussion on Commissioner Wilson's paper was opened by W. E. Atkinson, State Highway Engineer of Louisiana. Mr. Atkinson first reviewed briefly state road work in Louisiana and then took up the subject of convict labor. State convicts were used, he said, most of them being negroes, who, when properly controlled, made good laborers. He gave detailed information regarding the methods of employing convict labor and statistics of the cost of work performed by it. He believed that convicts would solve the labor problem. In referring to contract and force account work, he said that it was difficult to decide which was the better and that which should be employed ought generally to be determined by the engineer in charge. He then compared the two systems, pointing out the advantages and disadvantages of each.

Several others discussed the question briefly, one of the points brought out during the discussion being that the question of the economic value of a road was a question of getting back the money invested in it. The question of the honor system in working convicts was also touched upon.

The Wednesday program included an evening session at the convention hall at the Hotel Pontchartrain, at which there were scheduled a paper on "California's $18,000,000 State Highway System," by State Highway Engineer A. B. Fletcher and an address entitled "Dirt Roads and Politics" by Chas. P. Light, Field Secretary of the American Highway Association. It was also planned to have moving picture exhibits with explanatory remarks by Geo. C. Warren of Boston, Mass., and W. T. Beatty and B. F. Affleck, of Chicago, Ill., illustrating various features of road construction. After the meeting had been opened and Mr. Light had made his address, it was found impossible to show the moving pictures because of trouble with the current for the lantern and this part of the program was postponed until the following afternoon.

Thursday, October 2

The proceedings on Thursday, "Road Users' Day," were under the auspices of the American Automobile Association, the session being called to order at 10:30 a. m. by Chairman Geo. C. Diehl. Mr. Diehl introduced as the first speaker Chas. A. Magrath, Chairman of the Ontario Public Roads and Highways Commission. Mr. Magrath spoke briefly acknowledging the courtesies extended and suggesting that the organization come to Canada for one of its future conventions. He said he hoped that next year it would be possible to put before the convention an invitation from Ottawa or some city of Ontario.

Chairman Diehl then introduced Deputy Minister A. W.

Campbell of Ontario, who also expressed the hope that some future meeting of the organization would be held in his country and spoke briefly of the progress made in road work in Ontario. In the course of his remarks he said that the dominion government was ready to appropriate money as soon as the provinces were in position to handle the work.

The next speaker was Chairman John N. Carlisle of the New York State Highway Commission, the chairman of the session. In his opening address, Commissioner Carlisle outlined the geographical and topographical conditions in New York; quoted statistics regarding the roads and road work there, and explained in detail the operation of the State Highway Department. He said that a careful study had been made of the entire state in order to determine what types of roads should be built in each locality, taking into account traffic and climatic conditions and available materials for construction. In discussing types of roads, he touched upon the automobile traffic New York roads are required to carry, the varying climatic conditions of the state and the wide divergence in soil conditions in different parts of the state. He said that it was intended to practically reorganize the highway department, and spoke briefly of the ends to be attained by this and also gave some detalis of the proposed reorganization. He also described in some detail the patrol system which has been used in New York and said that in the reorganization it was planned to relpace this system by a system of section gangs, each having a steam road roller, a motor truck, a pressure distributor for oils and such other equipment as might be necessary.

The next speaker was Judge J. M. Lowe of Kansas City, Mo., President of the National Old Trails Road Association. In referring to Chairman Carlisle's address, Judge Lowe said that there was a time when the farmer was unduly burdened, but this condition did not obtain now. He said that in New York the first bond issue was carried largely by the voters in the city of New York, but that the second issue was carried almost unanimously. He also stated that 80 per cent. of the $100,000,000 at the disposal of the New York State Highway Commission was paid by the city of New York. The remainder of his address was devoted to the subject of national aid, and he severely criticised the plan proposed by Representative Shackleford and also the Bourne plan.

N. P. Hull of the legislative committee of the National Grange spoke next. In discussing the attitude of the farmer toward road work, Mr. Hull said that the farmers had perhaps been too conservative in the past, but that he did not blame them, as they had perhaps acted as the balance wheel. He said that we were all agreed that we should have better roads and he believed that we were all practically agreed that the cost ought to be equitably distributed between the locality, the state and the nation. We must not blame the farmer if he opposed the building of national roads that did not come near him. The farmers had no objections to boulevards across the country, to national roads nor to state highways, according to Mr. Hull, but they believed that a fair share of the money should go for roads from the farmers' doors to the market centers. He expressed the opinion that there was no question before the people that meant more than good roads. The food supply, he held, was an important matter as connected with road work, and he pointed out that 30 years ago, two out of three of the population were on the farm while now two out of three are in cities. The time was at hand, he said, when we must keep a part of the brains in the country, and he held that there was no one thing that would make farm life better and more attractive than good roads.

The last speaker of the session was Col. Sidney Suggs, State Highway Commissioner of Oklahoma, who described the progress of road improvement in his state and touched briefly upon the question of national aid. He said that he hoped the convention would get together and decide upon something definite to take to Congress.

After the announcement by Mr. Diehl that a discussion on traffic legislation would be held in the afternoon, the session was adjourned.

The afternoon session was called to order at 3 p. m. by Chairman Carlisle, who introduced as the first speaker Chairman Wm. D. Sohier of the Massachusetts State Highway Commission. After referring to the damage to the roads and bridges caused by heavy trucks, Col. Sohier said that until the roads could be built to suit the traffic it was necessary to regulate the traffic. He said that in England, France and other foreign countries they had these regulations and that recently rules and regulations had been made in Massachusetts. He described these regulations in some detail and stated as a principle of the regulation of extraordinary traffic that the community should not pay more for any individual's wear of a road than the profit made by that individual—if so, it would be cheaper to put him in the poorhouse. Col. Sohier also gave data on maintenance costs in England and described the heavy traffic on some of the English roads.

The next speaker was First Deputy Commissioner Geo. A. Ricker of the New York State Highway Commission, who explained some of the particular features of traffic regulation in New York State, with especial reference to motor traffic and the powers of the Public Service Commission in regulating certain classes of that traffic.

This was followed by discussion from the floor by Col. Wm. DeH. Washington, B. F. Stuck, Superintendent of Highways of the Philadelphia & Reading Coal Co., Tremont, Pa., and others, after which F. F. Smith, Vice President of the Quebec-Miami Highway Association, spoke on the history of the Quebec-Miami Highway and upon the work which had been accomplished in the building of that road.

On Thursday evening the American Highway Association held its annual business meeting at the convention hall of the Pontchartrain Hotel. The minutes of the last meeting at Atlantic City in 1912 were read by Secretary Pennybacker and accepted, after which President Page, in accordance with a vote of the meeting, appointed a nominating committee consisting of A. G. Batchelder, W. T. Beatty, P. T. Colgrove, A. N. Johnson, P. St. J. Wilson, C. A. Kenyon and John M. Goodell. The committee retired to decide upon nominations for officers for the coming year, and the reports of the secretary and treasurer were read and accepted. While waiting for the nominating committee's report, addresses were made by President Page, Judge Lowe and others, and a resolution of thanks to the citizens of Detroit and Wayne County and to the press for the courtesies extended to the congress and to the delegates was voted. On the return of the nominating committee it reported the following slate: President, Logan Waller Page; Vice President, W. W. Finley; Treasurer, Lee McClung; Secretary, J. E. Pennybacker, Jr.; Field Secretary, Chas. P. Light; Directors—L. W. Page, W. W. Finley, James S. Harlan, Alfred Noble, T. G. Norris, Charles Whiting Baker, A. B. Fletcher, Roy Chapin, Joseph W. Jones and L. E. Johnson. It was moved, seconded and voted that the secretary cast one ballot for the officers as named. President Page then addressed the meeting briefly, thanking the organization for his reelection as president and suggesting a vote of thanks to Secretary Pennybacker and Field Secretary Light for their activity in association work. He also reviewed briefly the history of the American Highway Association. C. A. Kenyon then moved a vote of thanks to the officers of the association, and it was passed. After some further remarks the meeting adjourned.

Friday, October 3

The two sessions on Friday comprised the sixth annual convention of the Michigan State Good Roads Association, the day being designated on the program as "Michigan Day." The morning session was called to order at about 10 o'clock by President Philip T. Colgrove of the association. The

Rt. Rev. Charles D. Williams, Bishop of Michigan, pronounced the invocation, after which Geo. H. Fenkell, Commissioner of Public Works of Detroit, welcomed the delegates to the city for Mayor Oscar B. Marx, who was unable to attend. During his address of welcome, Commissioner Fenkell referred to the effect of automobiles on the work of road improvement and reviewed the advantages of good roads. He also gave statistics of the pavements in the city of Detroit.

President Colgrove, after responding briefly on behalf of the association, gave as his presidential address parts of his annual report, which had been printed and was afterwards distributed. The printed report also included the reports of Secretary A. A. Anderson and Treasurer J. Edward Roe. President Colgrove's report reviewed the work of the association and also the work done by the State Highway Department during the past year. The president referred to the cooperation between the State Highway Commission and the association and expressed the association's appreciation of the efforts of State Highway Commissioner Frank F. Rogers. He also discussed national aid at considerable length, emphasizing the necessity for deciding upon some definite measure. He said that the government would do its full duty when Congress understood what the people wanted, but that that time was so far off that we could not hope or look for action in the near future. "We want roads today," he said, "while the average citizen is alive and can enjoy them, and, therefore, the states must continue this forward movement, each doing its part." He also referred to the "bee days" in Michigan, heartily commending the plan. The new laws and the amendments to old laws in Michigan were also touched upon briefly. President Colgrove closed with an appeal to the members of the association to renew their efforts in furthering the improvement of the roads of the state.

After his report had been accepted, President Colgrove introduced Governor Woodbridge N. Ferris of Michigan, who made the principal address of the session, his topic being "Rural Life and Good Roads." After stating that he was present not to offer information but as a matter of sentiment and to show his interest, he quoted statistics of illiteracy and good roads and said that he did not hold that they were cause and effect, but that it was apparent that good roads, good schools and intelligence went hand in hand. Referring to the "back to the farm" agitation, he quoted statistics showing that between 1900 and 1910 the rural population of Michigan increased 10 per cent. while the increase in the cities amounted to 39 per cent. He said that it was very natural that some should cry "back to the farm," but that he was not going to do that. There is no reason, according to Governor Ferris, why a boy should be kept on a farm if he wants to go to the city; the idea that all great men came from the farm and that the city is a kind of cesspool is a mistaken one. He predicted that in some way it would be possible to bring together the city and the country, and expressed the belief that good roads would accomplish this. In regard to the increase of property values through good roads, Governor Ferris held that it was not necessary to emphasize that point.

Referring to education, Governor Ferris said that perhaps aside from the waste in road building, nothing could compare with that in educational work. He said that the rural school was fairly successful up to a certain point and up to that point was preferable to any other. Beyond that, however, he believed instruction should be given in a school in which were consolidated the smaller schools, and consolidation was impossible without good roads. He held that it would pay to have good roads in Michigan solely from the standpoint of education.

The same kind of efficiency and economy could be obtained in religious life, through good roads, he believed, since with improved transportation facilities it would be possible to consolidate churches as well as schools. The great difficulty in all movements for betterment, is to awaken men and women to the fact that they need any betterment. The majority of the people are seemingly awake, but in reality are asleep. He said that it was hard work to take a new view, and that his main object in coming to the convention was to urge the adoption of a plan that would "get to" the people. He said that when the people of Michigan demanded better roads they would get them.

The next speaker was Jesse Taylor, President of the Ohio Good Roads Federation, whose subject was "Road Legislation and How to Get It." He held that the way to get road legislation was to work up public sentiment demanding it. He favored national highways and advocated the consolidation of the small local associations into state associations and in turn consolidating the state associations into a national organization.

The last address of the morning was by J. C. Ketchum, Master of the State Grange. In his address, Mr. Ketchum outlined the position of the grange and indorsed participation in road building by the national government. He said that the State Grange could be depended upon to aid in securing federal aid, but that it would also insist upon some voice in the distribution of the roads. He favored roads from farms to shipping points and said that the trunk lines could be taken care of by the present facilities.

The afternoon session of the congress was called to order at 2:30 by President Colgrove who announced that as Chairman Diehl of the resolutions committee of the congress was obliged to leave the city that afternoon the report of the resolutions committee would be received. The report, which was read by Mr. Diehl, and adopted without discussion, follows:

Whereas, the loss by reason of bad roads which everywhere lessens the profits of industry, increases the cost of living and burdens business enterprise, amounts to millions annually; therefore, be it:

Resolved, that the American Road Congress earnestly favors the creation of a national department of public works directed by a secretary, who should be a member of the President's cabinet.

Resolved, that the American Road Congress favors state highway commissions and state aid for the construction and maintenance of the main roads of the several states.

Resolved, that the American Road Congress favors the establishment of a national road system and favors the construction by the states, counties and towns of the lateral and connecting market highways.

Resolved, that the American Road Congress respectfully requests the Congress of the United States to authorize the President to appoint a commission from civil life, with sufficient appropriation to make a thorough and exhaustive report on and to recommend a system of federal aid.

Resolved, that the American Road Congress respectfully petitions the Congress of the United States to adopt the necessary legislation so that the United States may hereafter be officially represented at the international road congresses.

Resolved, that the American Road Congress favors the investigation by the United States Office of Public Roads of applications for patents affecting road and bridge construction before letters patent are issued.

Resolved, that the American Road Congress commends the Lincoln Highway Association for its efforts in seeking the establishment by popular subscription of a transcontinental highway as an enduring and useful memorial to Abraham Lincoln, and further commends the National Old Trails Association for its splendid work in the rebuilding of the Cumberland Road and the Santa Fe Trail.

Resolved, that the American Road Congress emphatically indorses the compulsory use of wide tires and road drags.

Resolved, that the American Road Congress favors, wherever practicable, the use of convicts in road construction and maintenance.

Resolved, that the American Road Congress favors long tenure in office of experienced and efficient highway officials.

Resolved, that the American Road Congress expresses its sincere thanks and appreciation to the citizens, commercial organizations and the press of the city of Detroit, of the county of Wayne and of the state of Michigan, for their hearty co-operation and generous hospitality towards this, the greatest of American road congresses.

The first address of the afternoon was made by Judge Lowe and was entitled "Storm Centers to be Avoided in Campaigns for Better Roads. It was principally a plea for federal aid, during which Judge Lowe advocated the imposition of a tax on tobacco to provide national funds for road construction and the putting of the army at work building roads. He also sketched the history and development of the National Old Trails Road Association.

Frank Hamilton of Traverse City, Mich., spoke next on "Trunk Line Roads," his address consisting principally of a sketch of the work of the West Michigan Pike Association in securing the construction of a road through the counties along the eastern shore of Lake Michigan. He also touched upon the state's trunk line system, explaining its object and emphasizing the advantages to be secured by its construction. Mr. Hamilton was followed by Dr. DeKlein of Grand Haven, Mich., who spoke further upon the West Michigan Pike.

The next speaker was Wm. F. Johnston, Secretary of the Michigan Trunk Line Highway Association, who spoke briefly outlining the main points of the paper he had prepared on the proposed state trunk line system. During his remarks he outlined the activities of the Trunk Line Association and reviewed the events leading up to the passage of the law. [The trunk line highway system of Michigan was described in "The Michigan Highway System," "Good Roads," Oct. 4, 1913, page 146.]

The next speaker was W. M. Bryant, Chairman of the Kalamazoo County Road Commission, whose topic was "Use of Prison Labor in Road Construction." Commissioner Bryant's address comprised a synopsis of the method of employing convicts in road work in Kalamazoo County, generally known as the Kalamazoo plan. He said that nearly one hundred miles of road had been built, mostly by prisoners, and that no guards were used, the prisoners being put on their honor. He believed that convicts made good workmen and favored the convict labor plan.

At the close of Commissioner Bryant's address, the reports of the committees on resolutions and nominations were received. The report of the committee on resolutions was adopted without amendment and embodied the following resolutions:

1. Your committee wishes to extend the thanks of the Michigan Good Roads Association to the American Road Congress for holding its third annual session in our state, and especially for inviting the Michigan association to participate in its proceedings. The sessions of this convention and exhibits brought here have been interesting and instructive to the road builders of Michigan and, we know, have been fully appreciated by them.

2. We wish to extend our thanks to the Board of Commerce and the citizens of Detroit for the hospitality and entertainment which have made our stay here both pleasant and profitable.

3. We also wish to express our hearty appreciation of the efforts put forth by the Wayne County road commissioners and their officials, who have made it possible for the visitors to become fully acquainted with the road building operations of the county, and to see many miles of their splendid concrete highways.

4. We further wish to express sincere thanks and appreciation of the unselfish and efficient work of the officials of the Michigan State Good Roads Association during the past year. The work of our president deserves especial mention in this particular and we should extend sympathy and cheer to his devoted wife, who is now patiently suffering from a bodily affliction which is very hard to bear.

5. The Legislature of Michigan is deserving of the special thanks of this association for the generous appropriation for good roads, for the passage of the trunk line act and of much other needed legislation recommended by this association at its last annual meeting.

6. We wish to express our hearty approval of the Michigan state reward road law, which has resulted in the building of more than 2,000 miles of substantial roadways in this state. Even though some of these roads may look to the tourist as though "they begin nowhere and go nowhere," it can be truthfully said that without exception, these roads have been built on the main lines between the market towns and adjacent farms, and when the system is complete, they will reach from town to town. In the meantime, these disconnected pieces of roads are the best advocates of the good roads cause we have in the state, and the building of them has, incidentally, trained several hundred men in the art of building good roads, which will prove one of the state's best assets as the building of roads continues.

7. Resolved, That this meeting indorse the resolution adopted by the Michigan Trunk Line Highway Association, and that the different good roads associations of the state are urged to use their best efforts to make a general Michigan "Road Bee Day" on June 14, 1914, a success in all parts of the state.

The report of the committee on nominations was then adopted unanimously, officers for the coming year being elected as follows: President, Philip T. Colgrove; Vice President, N. P. Hull; Secretary, A. A. Anderson; Treasurer, J. Edward Roe.

The program provided for an evening session at which a paper on "Concrete Roads" was to be presented by Frank F. Rogers, State Highway Commissioner of Michigan, and discussed by A. N. Johnson, State Highway Engineer of Illinois, and others. It was found that time permitted the presentation of this paper at the afternoon session, and on vote of the meeting Mr. Rogers read parts of the paper, which had been printed and distributed. The paper is printed in full elsewhere in this issue. State Highway Engineer Johnson not being present, his discussion was made a part of the records of the meeting but was not read.

The last matter coming before the meeting was the announcement by Secretary Pennybacker of the American Highway Association, of the appointment of the committee of five on uniform road legislation to act with the corresponding committee of the American Bar Association. This committee as appointed by President Page consisted of F. D. Wadhams, P. T. Colgrove, A. B. Fletcher, J. E. Pennybacker, Jr., and A. N. Johnson.

Saturday, October 4

On Saturday forenoon a short session was held, the only business coming before it being the reception of invitations for the 1914 and 1915 congresses. The meeting was called to order at about 10 o'clock by President Page, who occupied the chair during the first part of the meeting, later relinquishing it to Dr. Joseph Hyde Pratt. During the session representatives from New Orleans, La., Denver, Colo., Atlanta, Ga., and Peoria, Ill., extended invitations for the 1914 congress, and others from Los Angeles and San Francisco, Cal., and Spokane, Wash., invited the congress to come to their respective cities in 1915. Dr. Pratt adjourned the congress, sine die, shortly after 11 o'clock.

Exhibition

The exhibits, which were displayed on the main floor of Wayne Gardens and in the two tents outside of the building, included machinery and materials for road and street work, samples of various kinds of pavement, the road models of the U. S. Office of Public Roads, sample copies of publications, testing apparatus, etc. There were 63 exhibits by dealers or manufacturers of machinery or materials for road and street work, which, with one exhibit of typewriters, made a total of 64 commercial exhibits. Fifteen weekly and monthly publications had exhibition space. In addition there were two state exhibits and the display of the U. S. Office of Public Roads. The exhibitors were as follows:

COMMERCIAL

American Car & Foundry Co., Detroit, Mich.
American Ingot Iron Culverts.
American Steel & Wire Co., Chicago, Ill.

Anderson Tool & Supply Co., Detroit, Mich.
Association of American Portland Cement Manufacturers, Philadelphia, Pa.
Austin-Western Co., Chicago, Ill.
Baker Mfg. Co., Chicago, Ill.
Baker, & Co., R. D., Detroit, Mich.
Barber Asphalt Paving Co., Philadelphia, Pa.
Barrett Mfg. Co., New York, N. Y.
Bausch & Lomb Optical Co., Rochester, N. Y.
Blome Co., R. S., Chicago, Ill.
Buffalo Pitts Co., Buffalo, N. Y.
Canada Cement Co.
Carey Co., Philip, Cincinnati, Ohio.
Chamberlin, A. B., New York, N. Y.
Concrete Form & Engine Co., Detroit, Mich.
Detroit Typewriter Co., Detroit, Mich.
Dolarway Paving Co., New York, N. Y.
Dunn Wire-Cut-Lug Brick Co., Conneaut, Ohio.
Eureka Machine Co., Lansing, Mich.
Galion Iron Works Co., Galion, Ohio.
Good Roads Machinery Co., Kennett Square, Pa.
Good Roads Supply Co., Detroit, Mich.
Hall-Holmes Co., Jackson, Mich.
Hastings Pavement Co., New York, N. Y.
Holt Mfg. Co., Peoria, Ill.
Hunt & Co., Robt. W., Chicago, Ill.
Hvass & Co., Chas., New York, N. Y.
Jaeger Machine Co., Columbus, Ohio
Jennison-Wright Co., Toledo, Ohio.
Kent Machine Co., Kent, Ohio.
Keuffel & Esser Co., Hoboken, N. J.
Knickerbocker Co., Jackson, Mich.
Marion Steam Shovel Co., Marion, Ohio.
Michigan Portland Cement Manufacturers (8 companies).
Milwaukee Concrete Mixer Co., Milwaukee, Wis.
Municipal Engineering & Contracting Co., Chicago, Ill.
National Paving Brick Manufacturers' Association, Cleveland, Ohio.
Novo Engine Co., Lansing, Mich.
Orenstein, Arthur Koppel Co., Koppel, Pa.
Original Gas Engine Co., Lansing, Mich.
Port Huron Engine & Thresher Co., Port Huron, Mich.
Portsmouth Culvert Co., Portsmouth, Ohio.
Rapid Mixer Co., Grand Rapids, Mich.
Robeson Process Co., Pennington, N. J.
Rumely Products Co., La Porte, Ind.
Shannon Self-Locking Metal Culvert Co., Cincinnati, Ohio.
Standard Oil Co., Chicago, Ill.
Steel Protected Concrete Co., Philadelphia, Pa.
Tarrant Mfg. Co., Saratoga Springs, N. Y.
Texas Co., New York, N. Y.
Thomas Steel Reinforcement Co., Detroit, Mich.
Troy Wagon Works, Troy, Ohio.
Trussed Concrete Steel Co., Detroit, Mich.
U. S. Asphalt Refining Co., New York, N. Y.
U. S. Cast Iron Pipe & Foundry Co., Burlington, N. J.
Universal Portland Cement Co., Chicago, Ill.
Van Duzen, Roys & Co., Columbus, Ohio.
Wallis Tractor Co., Cleveland, Ohio.
Warner-Quinlan Co., New York, N. Y.
Warren Brothers Co., Boston, Mass.
Wheeling Mold & Foundry Co., Wheeling, W. Va.
Whitman Agricultural Co., St. Louis, Mo.

PUBLICATIONS

"The American City," New York, N. Y.
"Better Roads," Jamestown, Ohio.
"Canadian Engineer," Toronto, Canada.
"Cement Era," Chicago, Ill.
"Concrete-Cement Age," Detroit, Mich.
"The Contractor," Chicago, Ill.
"Engineering and Contracting," Chicago, Ill.
"Engineering News," New York, N. Y.
"Engineering Record," New York, N. Y.
"Michigan Roads and Forests," Detroit, Mich.
"Municipal Engineering," Indianapolis, Ind.
"Municipal Journal," New York, N. Y.
"Pacific Builder and Engineer," Seattle, Wash.
"The Road Maker," Des Moines, Ia.
"Southern Good Roads," Lexington, N. C.

MISCELLANEOUS

Michigan State Highway Department.
New York State Highway Department.
U. S. Office of Public Roads.

City Planning Exhibition at New York

An exhibition of American and foreign city planning will be held under the direction of the Heights of Buildings Committee of the Board of Estimate and Apportionment of New York City in the New York Public Library at Fifth Ave. and 42d St., from November 24 to December 6, 1913.

In the preliminary announcement defining the scope of the exhibition the exhibits are arranged under 22 heads, among these being bridges, culverts and viaducts; parks and parkways and cemeteries; streets and roads; street fittings and architecture, and transportation and traffic. Under the main heading of streets and roads there are 13 subheads, as follows: (a) Cross sections of highways having various widths and pavements; (b) location and spacing of streets; (c) effect of good roads on real estate values and on high cost of living; (d) different types of pavement and their relation to amount and kind of traffic and grades; (e) streets with and without curbs and gutters; (f) methods of street cleaning; (g) relation of street widths to traffic; (h) curved or straight streets; (i) skylines and effect of bordering buildings; (j) substructures; pipe tunnels; (k) arcades; (l) sidewalks; (m) one-way streets.

According to an announcement by the Advisory Commission on City Planning Exhibition of the Heights of Buildings Committee, made on behalf of the City of New York and the Merchants' Association of New York, the object of the exhibition is "to educate the general public to the meaning and scope of the subject and to show the taxpayer that right city planning is a good business proposition." It is also stated that after being shown in New York most of the material will be available for use in other cities. The Advisory Commission, of which Frederick C. Howe is Chairman and Geo. B. Ford is Secretary, has placed the work of collecting and installing the exhibits in charge of the American City Bureau, 93 Nassau St., New York, N. Y. The commission, however, will pass upon all material collected.

Federal Aid for Post Roads in North Carolina

Davie and Davidson Counties, North Carolina, have been designated by Governor Craig as the ones to be improved with funds supplied in part by the federal government under the act of Congress appropriating money for the construction of post roads.

The entire amount which will be allotted to North Carolina is $40,000. Of this sum $10,000 has already been designated for building a road between Swannonoa Gap and Old Fort. Of the remainder, $10,000 will be allotted to Davidson, and at least $10,000, and possibly the remaining $10,000, to Davie. The allotment to Davie County was made because of the progressive spirit recently exhibited by the people of that county in voting $175,000 in bonds for road construction. The road to be improved in Davie County will be that between Winston, Statesville and Mocksville.

Twentieth Annual Convention of the American Society of Municipal Improvements

The twentieth annual convention of the American Society of Municipal Improvements was held at Wilmington, Del., on Tuesday, Wednesday and Thursday, October 7, 8 and 9, as reported briefly in the issue of October 18. The sessions of the convention and the committee meetings were held at the Hotel Du Pont, the convention headquarters, and the exhibition which was held in connection with the convention was accommodated in rooms adjoining the auditorium of the hotel in which the technical sessions were held. The total registration, in which were included members, associate members and guests, was about three hundred. The meeting included, besides the presentation of papers and reports, the committee work and the discussion of various topics at the sessions, two excursions, participated in by most of the delegates, and a number of entertainments and social functions.

The day previous to the opening of the convention—Monday, Oct. 6—was devoted to the preliminary meetings of the various committees of the society. The organization has a number of standing committees on various technical subjects, two of the most important being the committees on standard specifications and standard forms. These two committees held meetings on Monday, and in the evening the finance and executive committees met.

The convention was formally opened at 11 a. m., Tuesday morning, Oct. 7. The first speaker was Governor Charles R. Miller of Delaware, who welcomed the delegates on behalf of the state. In the course of his address Governor Miller called attention to the progress which had been made in municipal improvement and to the part taken in it by engineers. He said that within the memory of many present a gathering of the character of the convention would have been impossible; that in earlier days roads in the rural districts were built by the farmers according to their own ideas, while now they were constructed under the direction and supervision of competent engineers; that in those days the gutter was the natural channel by which the city disposed of its sewage, and that modern pavements and sidewalks and the conservation of health by proper sanitation were unknown. He also reviewed the history of Delaware. Mayor Harrison W. Howell, President of the City Council, followed Governor Miller and welcomed the delegates on behalf of the city. During his speech, Mayor Howell stated that Wilmington had better streets, better street lighting, a better water supply and better municipal improvements for the amount of money expended than any other city in the country in which work was done under similar conditions. He also expressed the hope that in time Wilmington would be one of the best paved cities in the United States. Morris R. Sherrerd, City Engineer of Newark, N. J., a past president of the association, responded to the addresses of welcome. The next speaker was B. E. Briggs, City Engineer of Erie, Pa., the retiring president of the association. During his address President Briggs referred especially to the necessity for brevity in the papers presented at the convention and urged upon the members the desirability of taking active parts in the discussions following the reading of the papers.

The opening addresses were followed by the reports of Secretary A. Prescott Folwell, Editor of "Municipal Journal," New York, N. Y., and Treasurer E. L. Dalton, of Dallas, Tex., and the reports of the executive and finance committees. One of the principal matters referred to in the executive committee's report was that of the amalgamation of the Association for Standardizing Paving Specifications with the American Society of Municipal Improvements. The consolidation was passed upon favorably by the former organization at its recent meeting at Pittsburgh, at which its executive committee was authorized to take up the matter with the other society. The executive committee's report recommended that changes be made in the constitution of the society and that other conditions necessary for effecting the amalgamation be met. No definite action was taken at the morning session, however, the matter being laid over as special business, to be taken up during the evening. The last business of the morning was the election of committees on nominations and the place of meeting, as follows:

Nominations: Messrs. Fisher, Rochester, N. Y.; Sprague, Pittsburgh, Pa.; Sherrerd, Newark, N. J.; Kendrick, Birmingham, Ala., and Kingsley, Little Rock, Ark.

Place of Meeting: Messrs. Weatherford, Memphis, Tenn.; Kirkpatrick, Birmingham, Ala.; Kramer, Newark, N. J., and Kingsley, Little Rock, Ark.

The session on Tuesday afternoon was given over to the report of the committee on garbage disposal and street cleaning, of which J. E. Fetherston, Assistant Engineer and Acting Superintendent of Street Cleaning of the Borough of Richmond, New York, N. Y., was chairman, and the reading of a paper, entitled "Separate and Combined Sewers in Their Relations to the Disposal of Sewage," by John H. Gregory, Consulting Engineer, New York, N. Y. At 4 o'clock the convention adjourned, and a group picture of the delegates was taken on the Court House lawn opposite the hotel. The delegates were then taken on a trolley ride through the city as the guests of General Manager Crook of the street railway company. The trolley ride was followed by a tea for the ladies attending the convention, served on the mezzanine floor of the Hotel Du Pont by the ladies of the local reception committee.

Four addresses and the transaction of business occupied the attention of the delegates at the evening session on Tuesday. The addresses included a paper entitled "Springfield's Sewage Disposal Plant and Its Departure from Common Practice" by Alexander Potter, Consulting Engineer, New York, N. Y.; a paper entitled "Some Observations on Minimum Illumination for Street Lighting" by Jos. E. Putnam, Assistant City Engineer of Rochester, N. Y.; a paper on "Fire Prevention" by Powell Evans, Chairman of the Fire Prevention Commission of the Department of Public Safety, Philadelphia, Pa., and an illustrated lecture by Superintendent Edward R. Mack, of the Wilmington Park Department, on the park system of that city. The principal business of this session was the proposal of amendments to the constitution to make possible the amalgamation of the Association for Standardizing Paving Specifications with the American Society of Municipal Improvements, a matter which had been postponed from the morning session. The final action in the matter was postponed until the morning session.

On Tuesday evening the visiting ladies were guests at a box party at the Garrick Theater and afterward at supper at the Hotel Du Pont.

The first session on Wednesday was called to order at about 10 a. m. and was taken up by the presentation and discussion of papers, the election of officers for the coming year and the transaction of business. The first matter taken up was the discussion of the paper on the Springfield sewage disposal plant presented the previous evening by Alexander

Potter. This was followed by the presentation of a paper entitled "What Obligation, If Any, Is the State Under to a Municipality Where the State Board of Health Has Required the Abandonment of the Disposal of Sewage into Running Streams?" by Chester G. Wigley, Engineer for the State Board of Health of New Jersey. After the discussion of this paper the matter of constitutional amendments was again taken up and amendments making possible the amalgamation of the Association for the Standardizing of Paving Specifications and the American Society of Municipal Improvements were adopted, thereby combining the two societies into one, to be known as the American Society of Municipal Improvements. The amendments adopted admit to active membership county and state officials and provide that municipalities may become "municipal members" of the organization.

At this point the nominating committee reported its selection of officers for the coming year, and the slate as reported was elected as follows: President, Edward H. Christ, Grand Rapids, Mich.; First Vice President, Wm. A. Howell, Engineer of Streets and Highways, Newark, N. J.; Second Vice President, A. F. Macallum, Hamilton, Ont.; Third Vice President, N. S. Sprague, Superintendent, Bureau of Construction, Pittsburgh, Pa.; Secretary, Chas. Carroll Brown, Editor, "Municipal Engineering," Indianapolis, Ind.; Treasurer, W. B. Howe, City Engineer, Concord, N. H.; Finance Committee—Leslie B. Christie, Wilmington, Del.; F. J. Collins, Dayton, Ohio; Frank R. Allen, City Engineer, Pine Bluff, Ark. After the election of officers the committee on place of meeting reported in favor of Dayton, Ohio. During the discussion which followed the presentation of the report it was suggested that a ballot vote be taken on the question of accepting the report, and it was finally moved to defer the taking of such ballot until the evening session.

The last matter coming before the session was a paper by Professor Edward Orton, of the Ohio State University, Columbus, Ohio, entitled "Proposed Standard Specifications for Paving Brick of the American Society for Testing Materials." This paper was referred to the committee on standard specifications for brick paving.

Wednesday afternoon was devoted to a boat ride tendered by the city of Wilmington. Upon the adjournment of the morning session the delegates were taken in special trolley cars to the Wilson Line wharf, where they boarded the Wilson Line steamer "City of Philadelphia," which had been chartered for the occasion. The boat left at about half past twelve and went down Delaware Bay to a point a little above Ship John Light, where it turned, and came back arriving at the dock at about half past five. Luncheon was served on board the boat, and music was furnished by the First Infantry Band. During the trip Chief Engineer Nelson P. Lewis, of the Board of Estimate and Apportionment, New York, N. Y., a past president of the American Road Builders' Association, read a telegram from that organization conveying its greetings and good wishes to the American Society of Municipal Improvements, and on behalf of the American Road Builders' Association extended an invitation to attend its tenth annual convention at Philadelphia, Pa., on Dec. 9, 10, 11 and 12. He also announced the city planning exhibit to be held at the Public Library, New York, N. Y., Nov. 24 to Dec. 6, 1913, and extended an invitation to attend to the members of the American Society of Municipal Improvements and their guests.

At the evening session on Wednesday the first business taken up was that of the place of meeting in 1914. A motion was made to accept the committee's report designating Dayton, Ohio, and an amendment was offered substituting Boston, Mass., which was finally selected by vote of the meeting. After the taking of the vote, E. A. Kingsley commented upon the action, calling attention to the fact that the committee's report was apt to be rejected and the matter decided by the meeting. He moved an amendment doing away with the selection by committee and leaving the matter to a vote of the convention. The motion was carried.

The reports of the committee on fire prevention, Alcide Chausse, of Montreal, P. Q., chairman, and the committee on water works and water supply, A. F. Macallum, of Hamilton, Ont., chairman, were read and accepted. The next matter was the presentation of a paper on "Education in Fire Prevention," by F. W. Fitzpatrick, Consulting Architect, Washington, D. C., the paper being read by title. The report of the committee on standard specifications was then presented by the chairman, Chas. Carroll Brown, Editor of "Municipal Engineering," Indianapolis, Ind. The report as a whole was not ready in its final form, but Chairman Brown made a general statement concerning the work of the committee and of the several subcommittees. The eight subcommittees making up the general committee, together with the chairmen, were as follows: Wood block paving, J. N. Hazlehurst; bituminous paving, Linn White; concrete paving, F. R. Charles; stone block paving, J. C. Hallock; brick paving, E. H. Christ; asphalt paving, Geo. W. Craig; sewers, E. J. Fort; macadam and gravel roads, Arthur H. Blanchard. No report was made by the subcommittee on asphalt paving, and the subcommittee on brick paving reported that no changes in the specifications were suggested. Some correspondence in regard to the character of the oil to be used for the treatment of wood blocks, which had been incorporated in the records of the subcommittee, was read, the committee, however, making no formal report to the meeting. The subcommittee on concrete paving reported that there was nothing new to bring before the convention, but that the matter of reinforcement in pavements was being discussed by the committee. The subcommittee on macadam and gravel roads presented a progress report including a recommendation that the term "broken stone" be substituted for the term "macadam" because of the various ways in which the latter term was interpreted by different engineers.

The only specifications presented for adoption were those for stone block paving. The subcommittee having these in charge recommended the adoption, with a few minor changes, of the stone block paving specifications adopted by the Association for Standardizing Paving Specifications at the Pittsburgh meeting. The report also suggested certain matters for discussion. The changes in the specifications recommended by the subcommittee were principally those necessary to adapt the specifications to sandstone blocks as well as granite blocks. They were principally in the opening paragraphs describing the blocks themselves and were finally adopted.

During the discussion on stone block pavements, Major W. W. Crosby pointed out that stone blocks that were too hard, as well as those that were too soft, were objectionable, and suggested a test analogous to the rattler test for brick and the fixing of maximum and minimum limits for hardness. He suggested that the committee take this matter up. Major Crosby was followed by Col. J. W. Howard, of New York, N. Y., who suggested certain changes in the wording of last year's specifications for asphalt pavements. At this point the discussion turned to brick paving, Major Crosby stating that it had been suggested to him that the field for brick paving was being narrowed and that it was in danger of being superseded as a street surface because of the popularity of concrete and the improvements being made in stone block paving. He believed that uniformity was as important a factor as average toughness, as there was a tendency for brick to wear unevenly. He said that he would like to have the brick committee of the society consider the matter. This was followed by considerable discussion as to the method of conducting the rattler test for brick, principally as to whether individual records should be kept. Both Major Crosby and Col. Howard held that these tests and records were essential. The last matter coming before the meeting was the discussion of sewer specifications, in the course of which the question of how much cement should be figured to a bag was discussed at considerable length.

The session on Thursday morning was opened by the presentation of a paper entitled "Control of Sidewalk Construction and Maintenance," by A. Prescott Folwell, Secretary of the association. The paper consisted principally of a resume of methods followed in this work in various cities, the material for the paper having been secured from various cities by Secretary Folwell in securing data to answer a question submitted to the society's "clearing house" by one of the members. The methods employed were classified under four heads as follows: First, those by which the city does the entire work, charging all or part of the cost against the property owners; second, those in which the matter is left entirely to the property owners, either with or without supervision; third, those in which the work is done by contract and the contractor placed under bond, and, fourth, those in which the property owner is required to construct sidewalks when ordered by making his own contract for the construction, which is supposed to be supervised to a certain extent by the city engineer or similar official. The citation of the practice in the various cities was followed by comment by the author. The presentation of this paper was followed by the discussion of the question of the control and ownership of sidewalks, with especial reference to its legal phases. It was voted that a special committee of three be appointed to take up the matter and report at the next convention.

Wm. A. Howell, Engineer of Streets and Highways of Newark, N. J., read a paper entitled "The Standard Abrasion Test for Paving Brick—How it Works in Newark." In the paper Mr. Howell described briefly the tests employed in Newark and the method of marking individual brick in a rattler charge, and cited the results obtained. He held that the number of tests provided for by the standard specifications could profitably be reduced, and pointed out that in the case of the city of Newark it would be impracticable to make as many tests as were specified. He stated that not over half of the contractors using paving brick were competent to cull the brick and stated that the mass test was not sufficient unless records were kept of individual bricks.

The next matter taken up was the report of the committee on standard forms, presented by the chairman, J. C. Hallock, Deputy Chief Engineer of the Department of Public Works, Newark, N. J. This report included the reports of subcommittees on street lighting, street cleaning and refuse disposal, and bidding blanks. The report of the subcommittee on street lighting consisted of a suggested form for recording street lighting data. The report of the subcommittee on street cleaning comprised a standard form covering refuse collection and disposal adopted by the American Public Health Association in 1911. The report of the subcommittee on uniform bidding blanks comprised proposal forms for street improvement and sewer construction. In the report of the general committee it was stated that it was the belief of the committee that a large part of the benefit which it hoped would follow its activities would be due to the creation of sentiment among city officials and an understanding of the aims of the committee. The report stated that for this reason it had seemed best to confine its work during the past year largely to the presentation and discussion of the principles involved and "an effort to decide upon a few at least of the units to be employed in keeping and comparing records concerning the several classes of work described by the titles of the several subcommittees."

Continuing, the report called attention to the very common practice of presenting as cost data such statements, for instance, as that of the cost of asphalt paving as so much per square yard. It pointed out that in such costs the unit of a square yard of paving did not always include the same amount of work, and it was suggested that four units be used in all cases and that these units be excavation, concrete (base), curb and wearing surface. In discussing this matter, Geo. C. Warren expressed the belief that the adoption of these four units should be brought to the attention of every municipal engineer. He also suggested that the concrete foundation be paid for by the cubic yard rather than by the square yard, as it was impossible for an engineer to foretell the depth of foundation necessary on all parts of a street and that in certain places an extra thickness of concrete would be needed. He also urged the abolition of clauses in specifications making the performance of certain work optional with the engineer, and suggested that contracts contain lists of items sufficiently complete to provide for every possible contingency. E. A. Kingsley disagreed with Mr. Warren's suggestion that bids for concrete base be received on the basis of the cubic yard instead of the square yard. He said that he had found, as Mr. Warren had, that often extra concrete was required but that he had had no difficulty in agreeing with the contractor for the payment for the work on a percentage basis. Chairman Hallock of the committee said that the use of the square yard as a unit was comprehended better by the layman and that increased thickness could be taken care of by the item of "extra concrete," and that this was usually a very small one. After considerable discussion of various phases of the matter the adoption of the four units as suggested was moved and seconded and the motion carried. The adoption of the report on street lighting was then voted upon favorably, as was also the proposal form for sewer construction.

After several matters of business had been acted upon and Secretary Folwell had repeated the announcement in regard to the convention of the American Road Builders' Associatian and the city planning exhibit in New York, N. Y., which had been made by Mr. Lewis on the previous afternoon, the meeting adjourned.

Thursday afternoon was devoted to an inspection trip, made in about thirty automobiles secured by the local entertainment committee. Leaving the Du Pont Hotel at 2 p. m., the party was driven to the city pumping station and preliminary filters, where half an hour was allowed for inspection. The trip was then continued to the Porter Reservoir, passing through streets paved with bitulithic, asphaltic concrete and bituminous macadam laid by the penetration method on "Wilmington" base. At the Porter Reservoir an hour was allowed for the inspection of the reservoir, the filters and the laboratories of the Water Department. The party then continued over various streets and through Brandywine and Rockford Parks to 17th St., where a stop was made to inspect an asphaltic concrete pavement in the course of construction. From here the party returned to the hotel, passing over streets paved with Portland cement concrete, asphaltic concrete, penetration on "Wilmington" base, and a bitulithic pavement laid over old brick.

The last session of the convention was held on Thursday evening. The first matter taken up was the report of the committee on traffic on streets. The chairman, Col. J. W. Howard, presented a progress report. The early part of the evening was devoted to the discussion of various subjects not formally introduced by papers, this portion of the session taking the place of the "query session" scheduled for Thursday forenoon. The first subject taken up was the filing of maps in city engineer's offices. Wm. A. Howell, of Newark, N. J., read a number of letters he had received in reply to a question sent to the officials of cities of over 100,000 population, and the question was discussed at some length by various delegates. This was followed by a discussion of the possible advantages of covering sprinkling filters and regulating the temperature and ventilation of the buildings and underdrains. The next question considered was the placing of pipes and wires in pipe galleries. In speaking on this, Mr. Hallock said that several years ago a committee of the American Society of Civil Engineers made an exhaustive study of the question and that they reported, if he remembered rightly, that the interest on the investment in the galleries would more than pay for the repaving of the streets every five years. Col. Howard said that the reason for the impracticability of these structures was that the interests concerned were so diversified and the subsurface structures so great in number. He said that while pipe galleries were very desirable they were practically impossible. James Owen, Consulting Engineer of Essex County, N. J., suggested that there should be a paper on methods of repairing openings in streets and suggested that the question be taken up at some future meeting. President Briggs said that there seemed to him to be only one way of taking care of street openings—to have the city make the repairs at the expense of those who opened the pavement. This question was discussed at considerable length, the statement being made during the discussion that in Paris where there were pipe galleries there were many openings and the streets were in bad condition, while in German cities, where for the most part there were no pipe galleries, the streets were in excellent condition.

This was followed by a general discussion of conditions in Wilmington, at the suggestion of Geo. W. Sparks, of the Wilmington Street and Sewer Board, in which flushing and street cleaning received the most attention.

This part of the session was concluded by a discussion on street monuments and bench marks and the problem of trees in sidewalk areas.

After the close of the discussion, a paper entitled "Embankment in Road Construction; Proper and Improper Settlement" was presented by Geo. C. Warren, of Warren Bros. Co., Boston, Mass. This paper dealt with the question of constructing streets on fills and described failures due to settlement and the precautions necessary to prevent the settling of the fill and the consequent wrecking of the pavement, curbs and sidewalks. After some discussion on the subject, Mr. Warren showed a series of moving pictures of Warren paving plants in operation and bitulithic and Warrenite pavements in course of construction.

During this session a vote of thanks to the local committee, to the Chamber of Commerce, to the press and to those who had taken part in providing entertainment was passed. A vote of thanks to Secretary Folwell for his services was also passed on the motion of Mr. Owen. A telegram was read from Mayor Fitzgerald of Boston expressing his pleasure at the selection of that city as the 1914 meeting place of the organization. The convention adjourned late in the evening, the work having been completed without the necessity of a morning session on Friday as had been scheduled in the program.

In addition to the steamboat trip and the automobile trip over the city, many other entertainment features were provided by the local committee. Some of the delegates were accompanied by their wives and other members of their families, and ample provision was made for the entertainment of those who did not attend the sessions. A special committee of Wilmington women provided entertainment for the ladies, among these functions being theater parties on Tuesday and Wednesday evenings, a buffet luncheon at the Country Club on Tuesday afternoon, followed by an automobile ride around the city, and a card party on Thursday evening at the Hotel Du Pont. No efforts were spared by the local entertainment committees in providing for the comfort and pleasure of the delegates and guests, and the hospitality of the citizens of Wilmington was the subject of much favorable comment.

The exhibits shown in the rooms adjoining the auditorium where the meetings were held, though not extensive, were interesting and instructive and attracted much attention. The firms exhibiting were as follows: Addressograph Co., Chicago Ill.; Barber Asphalt Paving Co., Philadelphia, Pa.; Barrett Mfg. Co., Philadelphia, Pa.; Bausch & Lomb Optical Co., Rochester, N. Y.; "Better Roads," Jamestown, Ohio; Buff & Buff Mfg. Co., New York, N. Y.; Dunn Wire-Cut-Lug Brick Co., Conneaut, Ohio; Bureau of Inspection, Coleman Du Pont Road, Inc., Wilmington, Del.; Electro Bleaching Gas Co., New York, N. Y.; Good Roads Machinery Co., Kennett Square, Pa.; Lock Joint Pipe Co., New York, N. Y.; "Municipal Journal," New York, N. Y.; National Paving Brick Manufacturers' Association, Cleveland, Ohio; National Water Main Cleaning Co., New York, N. Y., Robeson Process Co., Pennington, N. J.; Union Clay Products Co., New Brunswick, N. J.; United States Asphalt Refining Co., New York, N. Y.; Charles Warner Co., Wilmington, Del.; Warren Brothers Co., Boston, Mass.; Warren-Knight Co., Philadelphia, Pa.; Yellow Pine Manufacturers' Association, St. Louis, Mo.

The Projected Construction of Experimental Road Sections in Scotland.

In December, 1912, according to an article in a recent issue of the "Journal of the Institution of Municipal and County Engineers" (Great Britain), the Scottish District of the Institution of Municipal and County Engineers appointed a committee to "collect and tabulate reliable data as to improved methods of road construction, and, particularly, information as to the effect of climatic conditions taken in conjunction with traffic upon experimental road lengths to be laid down in districts in Scotland, having distinctive climatic conditions."

After having the matter under advisement since the first of the present year, the committee has decided to put down experimental road lengths in a number of districts in Scotland. Arrangements have been made for the location of these sections in parts of that country where the climatic conditions are suitable for the experiments and where the local surveyors will cooperate with the committee. Provisional arrangements with county surveyors have been made as follows: Peebles, R. S. Anderson; Haddington, T. Callen; Dunbar, P. Clarke; Kirkcaldy, G. Donaldson; Dunblane, W. L. Gibson; Lockerbie, R. Paterson; Hamilton, R. Spittal; Ayr, A. Stevenson. A similar arrangement has also been made with Burgh Engineer David Ronald of Falkirk.

It is stated that the Road Board is cooperating with the institution in this work, and that it is expected that the experiments will be of exceptional interest on account of the close consideration it is proposed to give to the effect of climate. It is also expected that the great variations in climatic conditions in Scotland will facilitate the isolation of the factor of weather effect in the destruction of road surfaces.

Street Work in Atlantic City, New Jersey

Bids for paving crosstown avenues of Atlantic City, N. J., are so much lower than was expected by the city authorities that the ordinance providing for a bond issue to cover the cost of the improvement will be amended, so as to reduce the amount from $250,000 to $190,000. When the project was first proposed it was thought that the full amount, $250,000, would be required.

The Hassam Paving Co., Worcester, Mass., which submitted the lowest bid for the work, has recently been awarded the contract. The Hassam company's bid was $181,719.90. Other bids ranged between the amount bid by the Hassam Co. and $209,915.45, submitted by the Cleveland Trinidad Co. Most of the bids submitted, including that of the Hassam Paving Co. were for asphalt.

The "Good Roads Days" in Missouri

Because of the extensive publicity given them and the varied comments of which they have been the subject the Missouri "good roads days" would be matters of interest even were there nothing else to make them noteworthy. There was something else, however, for, according to reports, the citizens of Missouri entered into the spirit of the enterprise with an earnestness and energy that left no doubt as to the state of public sentiment regarding road betterment.

As noted briefly in "Good Roads" of September 6, August 20 and 21 were designated as "good roads days" in a proclamation issued in July by Governor Elliott W. Major of Missouri. The proclamation designated the two days as public holidays and called for a general suspension of business. Every able-bodied man in the state was urged to devote those two days to working on the public roads, and the women were requested to aid by supplying food for the workmen.

In the interval between the issuing of the call and the twentieth of August, careful plans were made for carrying on the work. State Highway Commissioner Frank W. Buffum traveled over the state investigating conditions in different sections and conferring with local authorities as to the nature of the work which should be done. In each section the forces were organized and placed in charge of some individual, in most cases a district overseer. A number of manufacturers loaned traction engines and road machines which were assigned by Governor Major to the counties where they could be used most efficiently, and a considerable amount of money to aid in the work was subscribed by commercial clubs and other organizations. Some of the county officials offered cash prizes to the districts doing the best work and in other counties the officials offered concrete culverts as prizes.

The lack of exact data from all sections of the state renders it impossible to present statistics showing what was actually accomplished in the state as a whole. Reports from individual districts and counties, however, invariably show that large numbers responded to the call for volunteer laborers and that valuable work was done. The work done in different parts naturally varied greatly in character as well as in amount, depending upon local conditions, the available forces, the facilities for performing the work, the skill of the workers and the quality of the supervision. The work included dragging, grading, the construction of culverts and similar work. Culvert construction was in charge of experienced concrete workers who acted as foremen, and it is estimated that 500 culverts of various sizes were built. It is estimated by State Highway Commissioner Buffum that about 300,000 men responded to the call on the two days and that the work done would have required a fund of $1,000,000 had it been done by contract or by hired labor.

FARMERS GRADING A ROAD IN BOONE COUNTY, MO.

Governor Major, Governor Hodges of Kansas, State Highway Commissioner Buffum, Secretary of State Roach, Congressman Shackleford and many prominent business and professional men, prosperous farmers and others took active personal part in the work.

In regard to the results of the "good roads days," Commissioner Buffum writes this journal, in part as follows:

"As to actual results of improvement it was not thought very much would be accomplished, but the willingness with

VIEW ON A SECTION OF THE PALMYRA-HANNIBAL ROAD IN MARION COUNTY, MISSOURI—OILED ON THE "GOOD ROADS DAYS."

A COUNTY JUDGE OPERATING A GRADER DURING "GOOD ROADS DAYS."

which the people responded far exceeded what had been expected. In many of the counties, the work being of a permanent nature, the Governor has decided to recommend to the next session of the Legislature the enactment of a law that will set aside two days in each year as road holidays. The one great thing necessary in this state for road betterment is convincing the people that poor roads are sources of expense—making the farmer see that he is losing money when the condition of a road will not permit him to haul more than 500 pounds to market. The result of the work on August 20 and 21 has had much to do with showing them that there is a way by which they can get out of the mud and that way is the cheapest and best. At its recent session, the Legislature passed a resolution proposing to submit to the voters of the state at the next general election a constitutional amendment providing for a 10-cent levy, as a state tax for road purposes. This will create a fund for state aid of nearly $2,000,000 and as the most difficult amendment to any constitution is one that provides for any increase in taxation it is going to take heroic efforts to carry this one. But, with another state holiday for road work and the same keen interest in the movement being manifested over the state there is today, we do not feel discouraged."

The County Commissioners of Hennepin County, Minn., have completed plans for the repair of county roads during 1914, and a survey has been commenced to ascertain which roads are to be improved. The total amount to be expended for this purpose is $223,000.

The Spokane County Good Roads Association is distributing post cards on which is printed the following: "If you will drag your roads three times between now and winter, two round trips each time, you will have better roads all winter and less mud in the spring. The taxpayers in your district are entitled to this small expenditure."

DEPUTY STATE HIGHWAY COMMISSIONER HAWKINS (2) INSPECTING WORK OF A CULVERT GANG WORKING UNDER THE SUPERVISION OF A LOCAL DRUGGIST.

Concrete Roads*

By **FRANK F. ROGERS**†

Much of value has been written in the past two years on concrete roads and pavements, but a great deal is in the nature of theoretical discussions quite largely based on laboratory experiments. Hence, when an opportunity is offered to make a field study of many miles of concrete roads, some of which have seen four years of service, it should not be lost.

The writer makes no claim to being a concrete expert but simply has been fortunate in having the opportunity to study at first hand, and in some detail, the behavior of a large mileage of concrete roadways in Wayne County, Mich. This county, without doubt, has a larger mileage of concrete roadways than any other county in the United States, or than is possessed by any equivalent area under a single local government in any foreign country. There are now completed in Wayne County about 65 miles of concrete highways outside the corporate limits of cities and villages.

For the reasons above stated the writer desired to spend the time allotted to him in a somewhat detailed study of the local concrete roads, which most of you will visit before leaving the city, rather than to treat the subject in a more general way. All of the main highways leading out of this city have been concreted to the outermost boundaries of Wayne County and several crossroads have already been concreted. The principal roads are the extensions of Woodward, Grand River, Gratiot and Michigan Aves., while River Road and the extension of Fort St. running southerly are concrete roadways that should not be overlooked.

The State Highway Department with the cooperation of the road officials of Wayne County and assisted by Prof. John J. Cox, Instructor in Highway Engineering at the University of Michigan, has just taken up some detailed and rather minute observations of these roads which will extend over a period of years in the hope that after a while a safe estimate can be made of the probable life and cost of maintenance of such pavements as the county is now building, and under such traffic, soil and climatic conditions as prevail in this locality.

The first work in this study will be careful traffic records covering enough time and at such frequent intervals as will give a reliable estimate of the average daily traffic for one year. The first records were taken for one continuous week beginning Aug. 21, and a part of this record which is given in the accompanying table will be used for the purpose of the present discussion.

The next step was to start a permanent record showing the present condition of each 25-ft. section (the distance between expansion joints) of all the different roads. The observations for this record were made Sept. 2, 3 and 4, and cover 6,384 sections and a little over 30 miles of road. Several pieces of road have not been taken at this time. The oldest roads were built in 1909 and the newest that were taken were built in 1912, having been down one year.

For the purpose of this record the defects in the slabs or sections have been classified as longitudinal, transverse and diagonal cracks and holes. The records were taken in ordinary field books, the left hand column of the left hand page having been previously numbered with an automatic number-

NAME OF ROAD	NUMBER OF 25 FT SECTIONS	WIDTH	DEPTH	AGGREGATE	MIX	YEAR BUILT	SOIL BUILT ON	TRAFFIC COUNT 24 HRS AVERAGE 1 WEEK	% MOTOR DRIVEN	% HORSE VEHICLES	DEFECTIVE SECTIONS					
											LONGITUDINAL CRACKS	TRANSVERSE CRACKS	DIAGONAL CRACKS	HOLES	TOTAL NUMBER	TOTAL %
WOODWARD AVE.	209	18'	6½"	CRUSHED COBBLES SAND	1-2½-5 1-2-3	1909	CLAY LOAM	2160	88.1-	11.9+	80	32	2	46	160	76.5+
WOODWARD AVE.	252	18	6½"	CRUSHED COBBLES SAND	1-2½-5 1-2-3	1910	SAND LOAM				29	22	6	11	68	27.0-
GRATIOT AVE.	326	16'	7"	WASHED PEBBLES SAND	1-1½-3	1911	CLAY LOAM	507	65.8+	34.2-	11	10	3	6	30	9.2+
GRAND RIVER AVE	61	18'	6½'	CRUSHED COBBLES SAND	1-2½-5 1-2-3	1909	CLAY LOAM	1064	56.5+	43.5-	11	2	1	3	17	27.9
GRAND RIVER AVE.	308	16'	6½"	CRUSHED COBBLES SAND	1-2½-5 1-2-3	1910	CLAY LOAM				59	20	29	46	154	50.0-
GRAND RIVER AVE	515	16'	7"	WASHED PEBBLES SAND	1-1½-3	1911	SAND LOAM				13	26	3	6	48	9.3
GRAND RIVER AVE	1208	16'	7"	WASHED PEBBLES SAND	1-1½-3	1912	SAND LOAM	352	66.5-	33.5+	70	44	13	5	132	10.9
MICHIGAN AVE	481	17'-8"	6½	WASHED PEBBLES SAND	1-2-4	1910	CLAY LOAM	1009	67.5+	32.5-	219	48	23	21	311	64.6+
MICHIGAN AVE	1570	18 16	7"	WASHED PEBBLES SAND	1-1½-3	1911	SAND LOAM				219	80	42	14	355	22.6+
RIVER ROAD	149	15'	6½"	WASHED PEBBLES SAND	1-2-4	1910	CLAY	538	78.9+	21.1-	49	5	6	2	62	41.6+
RIVER ROAD	434	15'	7"	WASHED PEBBLES SAND	1-1½-3	1911	CLAY				165	17	13	0	195	44.9+
RIVER ROAD	213	15'	7'	WASHED PEBBLES SAND	1-1½-3	1912	CLAY				14	8	4	0	26	12.2+
RIVER ROAD	208	15'	7"	WASHED PEBBLES SAND	1-1½-3	1912	CLAY				17	9	0	0	21	10.0+
FORT ST. ROAD	450	12'	7"	WASHED PEBBLES SAND	1-1½-3	1912	CLAY				0	19	9	1	29	6.5-

*Corrected Sept. 22. 1913.

TABLE SHOWING DEFECTIVE SECTIONS ON WAYNE COUNTY CONCRETE ROADS.

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*Paper presented at the American Road Congress, Detroit, Mich., Sept. 29-Oct. 4, 1913.

†State Highway Commissioner of Michigan.

ing stamp to designate the record number of each slab, while the four columns to the right were headed "L," "T," "D," and "H," respectively, being the first letters of the words indicating the defects named. Opposite each number and in the proper column, vertical, horizontal or diagonal marks were used for symbols to indicate the form of the crack, while small ovals were used to indicate such holes as seemed worthy of note. Tar had been spilled on many spots that were not defective.

Woodward Avenue Road

The first mile of this road was built in May and June, and opened to traffic in July, 1909, thus giving it full four years of wear. The traffic record of this road shows a daily average of 2,160 vehicles, of which 88.1 per cent. were motor-driven.

The soil is clay loam, inclining a little more to sand at the northerly end. A double track electric railway occupies the westerly side of the street. Between the railway and the concrete roadway is a very shallow gutter under which was laid a tile drain from 2 to 3 ft. in depth. On the opposite side is an open ditch, the bottom of which is from 2 to 4 ft. below the crown of the roadway.

The pavement is 18 ft. wide, has a crown of 3 ins. and a blind curb 8 ins. wide and 4 ins. deep under the outer edges which were somewhat beveled. The concrete was composed of Portland cement, crushed field stone or cobbles and sand mixed in the proportion of 1:2½:5 for the base which was 4 ins. thick. The top layer was made of the same materials, using a 1:2:3 mix and was 2½-ins. thick.

No very definite data can be secured to determine the wear, which seems to be slightly greater on the side opposite the railway, but measuring from some of the harder pieces of the coarse aggregate which have been worn but little, if any, we have estimated the general wear at about ¼ in., which would be an average of 1-16 in. per year.

This mile was divided into sections of about 25 ft., separated by expansion joints, there being 209 sections to the mile. The most of the sections were separated by four thicknesses of tar paper separated by thin boards which it was planned to remove as the work progressed, though many of the boards are still in the pavement. Four of the joints were protected by pairs of steel angle bars, separated by tar paper and placed with one leg of each angle back to back so that the other leg of each bar was flush with the surface of the concrete, thus covering a space of about 4½ ins. at the joints. The concrete wears slowly on each side of the angles leaving a raised joint that is slightly noticeable when driving over the pavement. This was an experiment which has not been repeated.

Of the 209 sections constituting the first mile on Woodward Ave., 80 showed longitudinal cracks, 32 transverse cracks and 2 diagonal cracks, while 46 sections were recorded as having holes, making a total of 160 sections which are more or less imperfect, or 76.5, plus, per cent. of the entire mile.

The remaining portion of Woodward Ave., 252 sections, was built in 1910 using the same materials and the same mix. No blind curb was used and the crown was reduced to 2 ins. The soil on this section is considerably more sandy, especially toward the north end.

On this portion of Woodward Ave. 29 sections have longitudinal, 22 sections transverse, and 6 sections diagonal cracks. Eleven sections have holes, making a total of 68 defective sections or 27, plus, per cent. as compared with 76, plus, per cent. in the first mile.

Gratiot Avenue

On Gratiot Ave. in the season of 1910, 9,000 feet of 16-ft. concrete roadway were built. On this pavement gravel and sand were used for the aggregate and a one-layer concrete having a 1:2:4 mix was laid. The soil is a clay loam and rather heavy. This road was not completed until late in the season and was opened to travel in November. It immediately pitted and looked rough and has been covered with a surface treatment of refined tar and fine gravel. It was recovered this season, using a rather light grade of tar (Tarvia A) but it already shows some tendency to scale off. The experience in some other places leads the commission to believe that a heavier grade of tar gives better results.

Beyond this portion of the roadway 326 sections of the same width concrete were laid in 1911 reaching to the county line. Washed pebbles and sand were used for the aggregate in a 1:1½:3 mix, one-course concrete, 7 ins. deep, being laid. The records for this piece are as follows: Longitudinal cracks, 11; transverse cracks, 10; diagonal cracks, 3; holes, 6; showing a total of only 30 defective slabs or 9.2, plus, per cent. The traffic count on this road, taken at the county line, shows 507 vehicles daily, 65.8 per cent. of which are motor-driven.

Grand River Avenue

On the Grand River Road 61 sections of two-course concrete, the same as laid in the first mile of Woodward Ave., were built in 1909. The soil is a clay loam. The records show 11 longitudinal cracks, 2 transverse cracks, 1 diagonal crack and 3 holes, a total of 17 defective slabs or 27.9, minus, per cent. The traffic count showed 1,064 vehicles, 56.5 per cent. of which were motor cars.

In 1910, 341 more sections were added to Grand River Ave. under contract, the specifications being the same as for the north end of Woodward Ave. Of these slabs 33 became more or less pitted, some having quite large holes. They have been repaired by covering with refined tar and stone chips so that no defects could be observed at the time of the count, hence only 308 are shown in the table. The defects noted are as follows: 59 longitudinal, 20 transverse, 29 diagonal cracks and 46 holes, a total of 154 defective slabs, or 50 per cent.

In 1911, 515 additional sections of one-course concrete were placed on the Grand River Road. Washed pebbles and sand were used for the aggregate with a 1:1½:3 mix. The Baker steel joint was used in all of this work except the first six sections. The defects noted are as follows: Longitudinal cracks, 8; transverse, 26; diagonal, 3; and holes 5, making a total of 42 defective sections or 8.2, plus, per cent.

In 1912, 1,208 more sections were added to Grand River Ave. reaching to the line between Wayne and Oakland Counties. The count on these sections shows as follows: 66 longitudinal cracks, 37 transverse cracks, 6 diagonal cracks and 5 holes, making a total of 114 defective sections or 9.4, plus, per cent. The soil grew more sandy as the road extended westerly, considerable stretches being almost free from clay or loam.

Michigan Avenue

On Michigan Ave. 481 sections of concrete, 17 ft. 8 ins. wide were laid, using washed pebbles and sand for the aggregate in a 1:2:4 mix. The soil for the most part is a sandy loam, but a little heavy. The count shows as follows: 219 longitudinal cracks, 48 transverse cracks, 23 diagonal cracks, 21 holes, making a total of 311 defective sections or 64.6, plus, per cent. The traffic count shows 1,009 vehicles, 67.5 per cent. of which were motor-driven.

In 1911, 1,570 sections were added to this piece of road, using washed pebbles and sand for the aggregate and a 1:1½:3 mix. The soil over which this pavement was laid is a sandy loam running into light sand at the west end. The count shows the following: 219 longitudinal cracks, 80 transverse cracks, 42 diagonal cracks, 14 holes, making a total of 355 defective sections, or 22.6, plus, per cent. In 1912 this road was paved to within 1¼ miles of the county line, and this year completed to the county line, but no record was taken farther west than the east limits of the village of Wayne.

River Road

In 1910, 149 sections of concrete, 15 ft. wide and 6½ ins. deep, were laid on the River Road, using gravel and sand for the aggregate and a 1:2:4 mix. The soil over which this road runs is for the most part heavy clay. The count shows as follows: 49 longitudinal cracks, 5 transverse cracks, 6 diagonal cracks and 2 holes, making a total of 62 defective sections or 41.6, plus, per cent. The traffic count shows 538 vehicles daily, of which 78.9 per cent. were motor-driven.

In 1911, 434 sections were added to this road some distance below the village of Trenton. The pavement was 15 ft. wide, 7 ins. thick, built of washed pebbles and sand for the aggregate, using a 1:1½:3 mix. The count for this stretch of road shows as follows: 165 longitudinal cracks, 17 transverse cracks, 13 diagonal cracks and no holes, a total of 195 defective sections or 44.9, plus, per cent.

In 1912, the gap between this piece of road and the southerly limits of the village of Trenton was closed in with a similar pavement to that just described, comprising 213 sections. The count on this piece shows defects as follows: 14 longitudinal cracks, 8 transverse cracks, 4 diagonal cracks and no holes, making a total of 26 sections or 12.2, plus, per cent.

The same year there was added to the south end of the work done in 1911 something over two miles of concrete roadway, but of this only 208 sections were counted. Of the sections counted, 17 show longitudinal cracks, 9 transverse cracks, no diagonal cracks and no holes, a total of 21 defective sections or approximately 10 per cent. The soil of the entire road was heavy clay.

Fort Street Road

In 1910, one-half mile of gravel concrete of a 1:2:4 mix, 12 ft. wide and 6½ ins. deep, was built on Fort St. This concrete, like that already referred to on Gratiot Ave., was built rather late in the season and was opened to traffic in November. It immediately pitted to such an extent that it has since been coated with refined tar and fine washed gravel, about ¼ in. in size. This covering makes an excellent surface and wears fairly well. Of course it was impossible to observe any further defects in the concrete at this time. Continuing south, in 1912, 450 sections of concrete 12 ft. wide, 7 ins. deep, and of 1:1½:3 mix were added. The count on this piece of road follows: Longitudinal cracks, none (although another observer has reported there are 2), transverse cracks, 19, diagonal cracks, 9, and holes, 1. Total defective sections, 29, or 6.5, minus, per cent.

From the foregoing, it is strikingly apparent that the percentage of defects varied greatly in the different roads. A careful study of this variation in connection with the age of the pavement will soon convince one that mere age has not produced the defects noted. For example, 252 sections built on Woodward Ave. in 1910 show but 27 per cent. defective slabs, while 308 sections built on Grand River Ave., the same year under the same specifications, show 50 per cent. of defective slabs. There are two noticeable differences. Grand River Ave. was built by contract on a clay loam soil while the portion of Woodward Ave. named was built by day labor under the direct supervision of the engineers of the County Road Commission, on a soil more sandy and presumably with a little better subdrainage. Again, 481 sections built on Michigan Ave. the same year, with sand and pebbles for the aggregate and a 1:2:4 mix, show 64.6 per cent. of defective slabs. This was on clay loam soil. We might also mention 149 sections built on the River Road in 1910 on heavy clay soil, under the specifications last named, which show but 41.6 per cent. of defective slabs.

The most noticeable feature concerning these defects is that the longitudinal cracks almost always appear in groups, seldom singly. This indicates that there must be some local conditions in the foundation, due to insufficient drainage, soil conditions, newly made fills or uncompacted subgrades that cause these defects. Longitudinal cracks almost invariably appear on fills and on cuts, apparently with as much frequency in the latter as in the former. It would seem that cracks on the fills are due to the settlement of the embankment, and in the cuts the presence of water and frost in the subgrade. Briefly, the writer's opinion is that these cracks are due, first, to the settlement of the newly made fills, and second, to water that has not been completely removed from the subgrade, plus frost. If these causes could be thoroughly eliminated it would seem possible to build concrete roadways to the width of 15 or 16 ft., where sufficient expansion joints were used, without fear of trouble from longitudinal cracks.

It has been argued by the Morse-Warren Engineering Co., in a recent publication, that it is impossible to build concrete pavements (wider than 12 ft.) which will remain free from longitudinal cracks without using longitudinal joints, unless the pavement is so thick as to make the price practically prohibitive. The table accompanying this report which shows 450 sections of 12-ft. roadway on the Fort Street Road would seem to bear out this assertion, but a mile of concrete on the Eureka Road, which the writer did not get time to inspect, shows a great number of longitudinal and transverse cracks in a 12-ft. concrete roadway, where the soil conditions are the same as on the Fort Street Road referred to. The only apparent difference is that the former is a 1:2:4 mix and the latter a 1:1½:3 mix, washed pebbles and sand being used for the aggregate in both cases.

But long stretches of pavement 16 ft. wide and now two years old on Grand River and Michigan Ave., which show no longitudinal cracks, would seem to prove that this statement is not necessarily true and that a sufficient amount of money spent in compacting and draining the foundation or in reinforcing the concrete over newly made fills, would produce pavements free from the objectionable longitudinal crease, whether natural or artificial. Most persons are agreed that transverse cracks are almost always due to defective expansion joints. It has been thoroughly demonstrated, both theoretically and practically, that 25 ft. is frequent enough for the expansion joints, and it is quite possible that they might be placed farther apart with safety—probably not less than three to 100 ft.

The diagonal cracks are doubtless due to causes which are a combination of those noted under longitudinal and transverse cracks. Many diagonal cracks were noted where the corners only were broken off, frequently on adjoining corners of adjacent slabs, indicating that the slabs were united through the expansion joints with a bond stronger than the tensile strength of the concrete on either side of the joint.

The holes noted are perhaps of less importance than the different kinds of cracks. In a few instances they are rather large, sometimes a square yard or more in area, but such places are very rare and most of the holes noted are due simply to some foreign substances getting into the concrete, like clay, wood or some fragment of an inferior rock that might chance to be a part of the aggregate. This was more noticeable where crushed cobbles were used for the coarse aggregate than where washed pebbles were used.

Any one familiar with the quality of rocks which constitute Michigan cobbles will understand that the principal objection to this material for an aggregate on concrete roads is the varying qualities of these rocks, ranging from soft to hard granite, quartzite and trap. A study of the roads where these materials have been used shows much more wear in the spots where the softer rocks happen to be at the surface.

Up to the present time the defects noted, except the pitted conditions of the concrete roads which have been resurfaced in the manner already described, are not serious and are not causing any additional expense for upkeep. In the past two years the expansion joints on all the old work, whether reinforced or not, have been coated with refined tar and sand once a year. Thus far, the cost has ranged between $30 and $100 per mile, depending on the distance of the work from the base of supplies. These repairs are proving adequate and satisfactory, and while the defects noted are something of a reflection on the present method of building concrete roadways they are really no reflection on the use of concrete as a suitable material for making hard and durable surfaces over our country highways wherever traffic conditions warrant, and the community has the ability to pay the cost of high class road surfaces. There is no question as to the necessity of some form of very permanent roadway near the city of Detroit, neither is there any question as to the ability of Wayne County to pay for a roadway that is good enough and permanent enough to meet the requirements of its traffic. In the writer's opinion, Wayne County has made no mistake in choosing concrete as a paving material for its main roads.

Treatment of Worn-Out and Raveled Macadam Surfaces*

By COL. E. A. STEVENS†

Before discussing the cure it is well to define the trouble, and to analyze its causes. The word "raveling" is used rather loosely. For my purpose I shall consider it as the loosening of the bond of a road surface until the macadam stone lies loose and free on the road. By macadam stone, I mean, not the small stone used to fill voids and give a smooth finish to the surface, but the stone that constitutes the body of the road's surface. In macadam work this stone when compressed to its final form occupies about 60 per cent. of the volume of the road surface. The 40 per cent. of voids is filled in varying proportions with surface stone, screenings, stone dust, sand, earthy materials and any chemical binder used to "hold the road." The mixture of fine stone, sand and earth filling the voids has no appreciable tensile strength. Its duty is to wedge the macadam stone in place and prevent internal movement. Such a structure is called on to carry loads, to receive and absorb propelling thrusts. The road should be of sufficient depth to transfer the stresses thus imposed to the sub-base without serious internal movement and at unit pressures less than the resisting power of the soil. It is thus subjected to vertical and horizontal forces that contribute largely to raveling.

Let us briefly consider these.

A draft horse weighing 1,200 lbs. will have all his weight at one time on two feet. He will exert say one horse power at a speed of 4 miles per hour. The vertical force at the foot is 600 lbs., the horizontal $\frac{33{,}000}{2\times4\times88} = 47$ lbs., approximately. These forces are, or may well be, concentrated on a toe calk 2 ins. in width, the resultant force slightly exceeding 300 lbs. per linear inch.

A motor truck weighing, loaded, 16,000 lbs., and exerting at the wheel rims say 30 HP. at 10 miles an hour, will, with 60 per cent. of the load on the rear axle, exert a vertical force of 4,800 lbs. and a horizontal of 562.5 lbs. at each rear rim, the resultant being about 800 lbs. per lineal inch for a 6-in. tire.

For a pleasure car weighing 4,000 lbs. with 60 per cent. of the weight on the rear axle and exerting 40 HP. at the wheel rims with a speed of 35 miles, the vertical force at each wheel is 1,200 and the horizontal 214. The resultant is about 400 per linear inch for a bearing width of 3 ins.

At curves, with high speed cars, the horizontal force is considerably increased, for it is impossible to so "bank" a curve as to suit the speed of all classes of traffic.

In the case of wheels transmitting vertical loads only, observation indicates but little dust rising from a road not overlaid with loose dust. Such a wheel will at the point of mathematical tangency have no velocity relative to the road; a vertical velocity is imparted to it and as any section leaves the surface it will raise with it any of the lighter particles that are loose and may come into contact with it. At the driving wheel there is a slight slip which in addition to lifting will throw particles backwards.

These are the forces tearing at the road surface. In some cases they are more than the road can stand. The horse's calk acts somewhat like a chisel. It will pry out the binding material between the stones as well as the latter themselves when the bond is weakened. The driving wheels of motor vehicles push or suck any material thus loosened out of place. The binder loses weight as it parts with moisture; besides this, without moisture it also loses, not only its property of recementing itself under pressure but, to a great extent, its binding power as well. The real work of transmitting the stresses due to traffic must be borne by the stones. These are merely held in place by the binder. The latter, is gouged out by the horse, drawn or pushed out by the automobile tire, blown away by the wind, or washed off by the rain and a loosening of the upper stone results.

Even on a well consolidated road climate stresses impose a heavy duty. If, however, there be voids the risk of failure increases. Voids may be due to deficient rolling or to the rise of too much clay in the earthy binder. Lumps of this material will bridge the space between stones, even under hard rolling. The bridge will break down eventually either from pressure or moisture or a combination of them. A void forms where the bridge was and continues rising until near the surface when raveling results. The same may be true in the cases of too light rolling.

When bituminous material is used as binder it is liable to disintegration from weathering, from overheating or from the admixture of earthy materials.

An ordinary water bound macadam may lose material by wear up to a thickness of about a half an inch a year without being overloaded. The thickness that can thus be lost will vary with conditions, one of which probably is the ratio of the maximum wheel load to the total tonnage borne by the road.

Whatever the rate of waste, it must be replaced if the road is to be maintained.

To summarize the foregoing: Roads ravel from (1) improper construction; (2) overload, and (3) neglect. In all cases these affect the binder.

Poor workmanship in construction can be cured only by remedying the original defects. These generally show themselves by small local depressions in the surface from which raveling spreads, in certain cases at an almost incredible speed. In bituminous surface faulty material and thin spots generally show up clearly. In both cases the only remedy is to rebuild the work properly, if necessary, from the sub-base up. This is not strictly repair work.

In considering the effect of overloading and neglect it must be borne in mind that any given type of construction may be so maintained as to vastly increase its carrying capacity. The problem is largely one of economics and administration. As an illustration, assume in two cases the same foundation—let one road have a water bound macadam surface dressed with a heavy bitumen forming a sheet about ½ in. in thickness and the other a bituminous concrete (mixed method) surface of say 2 ins. The former will cost about 40 cts. for stone and 15 cts. for dressing, or 55 cts. per sq. yd., and the latter about $1 (both exclusive of the foundation). With proper care the lighter surface will last about three years under fairly heavy traffic, the heavier one an unknown period, but let us assume twelve years. The total yearly charges against the two may then be stated about as follows:

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†State Highway Commissioner of New Jersey.

	Cents.
Dressed macadam:	
Interest on cost, $0.55 at 4%	2.2
Depreciation, ⅓ of 15 cts	5.0
Labor (patrol system)	1.9
Materials:	
Stone ⅜ cu. ft. at 9 cts	3.4
Bitumen ⅛ gal. at 12 cts	1.5
Total	14.0
Bituminous concrete:	
Interest on cost, $1 at 4%	4.0
Depreciation, 1.00/12	8.3
Labor	0.9
Material	0.8
Total	14.0

The fixed charges are 7.2 cts. against 12.3 cts.

The operating charges, 6.8 cts., against 1.7 cts.

I do not claim that these figures are more than illustrations of the principle involved. They show a great saving in operating charges, those that show up in the yearly tax bill. The fixed charges, however, are just as real and must be met at some date.

For a road with 9,500 sq. yds. per mile the costs as shown in yearly tax charges, where depreciation and interest are not visible, would in this case be,

For the dressed macadam, per mile	$636.50
For the bituminous concrete	161.50

Yet as shown above the real cost of the two roads is the same. This case affects our subject because the treatment of a raveled road surface must depend on the system of maintenance.

In most communities the great consideration is the next yearly tax bill. If that can be kept down for a period the ultimate economy of such a policy receives but slight attention. It is generally easier to get money for a new road than for repairs. A road requiring a large yearly repair charge is condemned without a hearing. The road calling for heavy interest and depreciation charges may be an equally or even more expensive solution; but the interest charge is not so apparent and the depreciation charge is not made. This is simply putting off the day of reckoning which is sure to come. However, the troubles of those in charge ten years hence are usually lightly borne by the officials today.

If we consider the structure of the road surface we can easily see that the 40 per cent. of voids in the macadam stone will be filled somewhat as follows:

Surface stone, passing 1-in. ring and caught on ½-in. ring	15% to 20%
Screenings, passing ½-in. ring	15% to 10%

The other 10 per cent. should be composed of sand and clay.

When dry the clay is driven off to a greater or less extent as dust, washed away or splashed off as mud. Its place is supplied to some extent by detritus, the result of the wear of the larger and heavier materials. These also blow or wash away and the road loses its bond. If our road is not overloaded, we can retain its usefulness by making good its losses with proper materials in their needed proportion. It is here that the trained road man is most needed. Nothing can replace his experienced judgment.

In the case of a raveled road, having first determined that the road was well built, we must decide whether the traffic is too great for the type of surface, or whether the failure was due to neglect. If the former, we must resurface with some better type. If the latter, we can repair the old surface.

Resurfacing should always be preceded by scarifying and by bringing the road up to the necessary depth of stone. For water bound macadam needing greater surface strength, several classes of chemical binder may be used, of which I shall discuss two, bitumen and lignin.

The bitumen may be applied either by penetration or mixing methods. The former is the cheaper, the latter the more trustworthy. Which method is to be used will, after consideration of the care the road will receive, depend on the estimate of the overload, as will also the depth of the bituminous sheet. My own observation leads me to question the wisdom of attempting to get any thickness exceeding ½ in. by penetration methods. It also leads me for this class of work to prefer tar to asphalt. The former material appears less sensitive to injury by dirt and to yield better results in repair work.

The lignin binders are derived from the waste products of wood pulp or tannin manufacture. They are cements, being also used to bind core sand in foundry work, and impart a tensile strength to the binding materials. They will not act on materials soaked in the so-called road oils. The action of some of these materials on slag and red shale is quite remarkable. They are slightly soluble in water and will therefore need renewal. Their application, however, is easy and inexpensive, and the effect of successive applications seems cumulative, increasing not only the depth of penetration but the strength of the bond. The waterproofing of lignin bound roads with bituminous tops has been carried out in Connecticut, but I am unable to give any facts as to the results.

For water bound macadam roads that have failed through neglect a thin coat of gravel carrying some earthy matter or of screenings or coarse sand mixed with earth will usually cure cases that have not gone too far. In some of the counties of New Jersey it is usual to fill all ruts, depressions, etc., with fine stone and to give the middle of the road a coat of the same mixed with a little clay. Much of this material is wasted by being thrown off the road by the traffic, and the old ruts almost invariably reappear. This method, however, is very successful in preventing raveling. It seems a false economy to omit rolling, and wet rolling, at that. The same is true of patching holes with anything but macadam size stone. The roads treated with small stone are yearly losing depth. The moisture for wet rolling is usually bountifully supplied by nature, in the early spring. It can also be had by the use of hygroscopic salts where water is hard to get. Traffic will usually throw off from the road surface enough stone to pay for rolling.

A treatment of clay, without rolling, will often give astonishing results. Such treatment, however, seems only a palliative, not a cure. Roads thus treated become dusty or muddy, according to the weather, show a tendency to ravel again and are hard to properly treat with bitumens. They will, however, take the lignin binders with good results, if the dose of clay has not been excessive, or if the excess is swept off before treatment.

In closing, a word of warning as to the use of the so-called cold oils may not be out of place. Those of the so-called non-asphaltic class, to a greater extent than the so-called light asphaltic oils, seem to act as lubricant on road materials and to foster pot holes, raveling, and other failures. It may be possible to properly apply these materials, but, if so, it is rarely done. It is certain that even slight depressions will cause a deep penetration of the road. The dust laying qualities of the material thus absorbed are lost, and its lubricating effect given the best possible conditions to get in its pernicious work. Local authorities, and even private individuals, seem to select roads with uneven surfaces as those on which to use these oils.

Waterway Structures[*]

By A. R. HIRST[†]

Among the most important considerations affecting the construction of public roads is that of drainage. The life of every road structure depends upon the drainage given it, and the culverts and bridges necessary must be built not only to serve the purpose of drainage, but must serve also the convenience and safety of travel. The failure of a road results only in the additional expense necessary to replace it in proper condition, but the failure of a bridge results also in the suspension of travel, and if it occurs at the wrong moment may cause considerable loss of property and possibly injury or death to those traveling the road.

For many years both the design and erection of highway bridges was practically entirely in the hands of the steel bridge companies, who used their opportunity to the utmost and decorated the landscape with structures which had little to commend them except the fat prices they brought from an unknowing public.

Within the last few years, however, many states have created highway commissions which have effectually taken up the problem of bridge design, and a considerable change for the better has occurred, both in the strength of bridge superstructures and in the foundations, more especially in the latter, which was the place where most of the older structures were especially deficient, if one point of weakness can be selected from the mass of general ineffectiveness.

A properly designed waterway structure should fulfill the following requirements:

1. Waterway sufficient to carry off promptly the water coming to it.
2. Proper foundations to bear the loads, resist undermining, and give long service.
3. Superstructure designed to bear for a long period of years any load which may legally be imposed upon it.
4. Superstructure wide enough and so constructed as to serve the comfort and convenience of travel.
5. Economy of maintenance.

A sixth factor, that of aesthetic design and fitness of the structure to the surroundings, has been and is little considered in bridge and culvert design, but will probably be demanded more and more as public appreciation of the value of pleasing design grows.

In the short compass of this paper we cannot enter into a discussion of bridge design, or give any details of any specific type of structure. We will, however, give some account of our standard practice in the state highway work in Wisconsin, and probably this will be sufficient evidence of our views as to what constitutes a proper waterway structure.

Wisconsin is a state aid state, and gives state aid to bridges and culverts, as well as to road construction. All waterway structures 6 ft. and under in span are classed as culverts, and are built out of the funds available for the construction of the road. All waterway structures over 6 ft. in span are considered as bridges and must be provided for by separate appropriations, the state paying 20 per cent. of their cost instead of 33⅓ per cent. as in the case of culverts on roads.

Wisconsin has a drastic bridge law which provides that culverts under 18 ins. in span must be so constructed or reconstructed as to stand without planking a load of 18 tons, and waterway structures over this span must be designed "in accordance with standard engineering practice," to stand a load of 15 tons without planking.

In addition to the duty of designing all state aid bridges and culverts, the State Highway Commission has imposed upon it by law the duty of approving as to their safety and engineering sufficiency the plans of all bridges constructed with county aid. In the seven seasons of the existence of the Wisconsin Highway Commission and its predecessor in highway work, the Wisconsin Geological and Natural History Survey, we have designed about 1,000 highway bridges of a span exceeding 10 ft. for counties, and about 400 bridges exceeding 6 ft. in span, and innumerable culverts under this span for the state aid construction. In addition to this, we have approved the plans for probably 300 bridges not designed by our engineers, but simply checked as to engineering sufficiency. Actual culvert and bridge construction under our own designs has cost about $2,000,000.

We may roughly divide our bridge superstructures into five classes, as follows:

Class 1, Spans from 18 ins. to 10 ft.—Almost invariably constructed of reinforced concrete of the slab type. We are building even the smallest culverts of reinforced concrete, as we find in Wisconsin that they are entirely serviceable, easily constructed, and in probably 50 per cent. of the cases cost less than any other type of culvert except wood, which is not allowed on any of our work. The smallest concrete structure we are now building is 18 by 12 ins., as we have found the smaller sizes equally as expensive and very easily blocked with ice and debris.

In some cases, where the foundation conditions are extraordinarily soft and difficult or concrete materials are not reasonably available, we use culverts of corrugated metal with concrete or stone end walls, but such culverts are used only where it is impracticable to use concrete, and probably not one per cent. of our culverts are now built of this material. Vitrified clay is not used at all on state aid work, as culverts built of it have been found almost invariably to crack by filling and freezing. Concrete pipes molded in place and afterwards moved to the job are not used for the same reason. Under conditions favorable to their use, both make excellent culverts, and we would recommend them in less severe climates. Cast iron water pipe has not been used on account of its cost, which invariably exceeds that of concrete.

We find in the small concrete culverts from 18 ins. to 10 ft. the average cost per cubic yard complete, including the excavation and backfilling, is about $8 and very seldom runs above $10 per cu. yd.; sometimes as low as $6.

Class 2, Spans from 10 to 40 ft.—Either reinforced concrete, the slab type up to 18 ft. and the through girder type up to 40 ft., or I-beam structures with concrete floors are used. We are building many true reinforced concrete bridges, but with public lettings open to any bidder the workmanship and finished appearance have been so poor in many cases that we are using more I-beam structures than we otherwise would. In the case of I-beams, a 5-in. concrete floor is placed on top of the I-beams, and the corrugtaed arch type of support for the concrete between the I-beams is but seldom used.

Class 3, Spans from 40 to 80 ft.—We are using the Warren riveted pony truss practically exclusively, though a few plate girders are being used where the conditions of hauling are favorable. All of these structures have concrete floors.

Class 4, Spans from 80 to 135 ft.—We use the riveted Pratt high truss with a horizontal top chord, also with a reinforced concrete floor.

Class 5, Spans over 135 ft.—We use a Pratt riveted high truss with a curved top chord. Practically all of these larger spans are also built with a reinforced concrete floor. Very seldom do we use a pin connected truss, either for Class 4 or 5, probably not once in twenty-five cases.

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[*] Paper presented at the American Road Congress, Detroit, Mich., Sept. 29-Oct. 4, 1913.

[†] State Highway Engineer of Wisconsin.

From our cost figures on all bridges so far constructed we find that for any span the price erected (including substructure and superstructure) figures out very close to $40 per lin. ft. of the over-all span. Reinforced concrete floors average about 20 cts. per sq. ft. Steel in plate girder and truss spans averages from $65 to $70 a ton erected, and I-beam spans figure from $50 to $60 a ton erected.

We have adopted for widths for concrete culverts and bridges the standards recommended by the Association of State Highway Departments, which are as follows:

First-Class Roads:—	
Culverts under 12 ft. span, minimum width	24 ft.
Slab bridges over 12 ft., minimum width	20 ft
All other concrete spans, minimum width	20 ft.
Very long bridges less if necessary.	
Second-Class Roads:—	
Culverts less than 12 ft. span, minimum width	20 ft.
Slab bridges over 12 ft. span, minimum width	18 ft.
All other concrete bridges, minimum width	18 ft.
Third-Class Roads:—	
Culverts less than 12 ft. span, minimum width	20 ft.
Slab bridges more than 12 ft. span, minimum width	18 ft.
Longer bridges may be, minimum width	16 ft.

Steel bridges are built almost invariably with a 16-ft. roadway; that is, 16 ft. clear distance between trusses or rails, no matter what the class of road, although for spans under 80 ft. some 18-ft. clear roadways have been built.

Abutments under practically all structures are plain concrete, as with concrete materials as cheap as we have them in Wisconsin, and with the difficulty of getting first class workmanship in reinforced concrete foundations without constant inspection, we find that this is the cheapest type of abutment. Occasionally cement rubble masonry abutments are used, and once in many times driven steel I-beam piles surrounded by a concrete wall are used. The last type of abutment has been found to be very satisfactory and economical for high abutments on sandy bottoms, and has largely displaced the use of cylinders with steel backing. Steel backing is not allowed on any state aid structure. The price of concrete in bridge abutments and piers averaged last year about $8 per cu. yd.

A large share of the trouble with bridge structures results from improperly designed foundations. A common fault is stopping work before a proper depth below stream bed is reached. Seldom should foundations extend less than 4 ft. below the stream bed, and whenever doubt as to the bearing power of the soil at that point is entertained, or as to undermining from a rapid stream, they should be carried down to solid soil or thoroughly piled. All foundation work should be inspected as the excavation is made and material is placed, not necessarily by an engineer, but at least by an honest man with good judgment and backbone. All concrete work in any part of the structure should be inspected as it is placed. Inspection of steel and workmanship on it as it is erected is not so necessary, as it can be inspected and its compliance with the specifications determined after erection at the time acceptance is to be given.

As to methods of letting the work: We have found it necessary to have open competition and sealed bids on bridge work, and by asking for mailed bids on all work have established true competition and have to a very large extent broken up the old system of "pooling" and combinations of the bridge agents who may be on the ground at the letting. We furnish complete plans for foundations and for reinforced concrete, I-beam and plate girder spans, and all bidders submit prices on our uniform plans. For truss spans we furnish the truss diagram showing the stresses in the truss members and the make-up of the truss members, floor system, and principal connections, and the successful bidder submits for approval the shop drawings before fabrication is commenced. For trusses we believe the latter system is preferable to that of furnishing complete shop drawings, as it allows manufacturers to follow their standard shop practice in detailing so long as those details are satisfactory.

The proper design for culverts and bridges is an engineering problem which should always be left to engineers. Probably a state highway department can handle it more economically than can private engineers, as so many bridges will be built of one span that superstructure plans can be standardized and even the same foundation plan may fit several bridges. The cost of designing, letting and accepting bridges in Wisconsin has averaged us about 3½ per cent. of the total cost. Inspection has been paid for separately by the local units. It would probably be better to have a state inspector on each bridge, but we have gotten very good results through local inspection at probably 25 per cent. of the cost of placing a man on each job. Important jobs should have a skilled inspector by all means.

The Consolidation of Embankments in Road Construction

In a paper entitled "Embankment in Road Construction; Proper and Improper Settlement," presented by Geo. C. Warren, President of the Warren Bros. Co., at the twentieth annual convention of the American Society of Municipal Improvements at Wilmington, Del., last month, the consolidation of fills to carry pavements was discussed at length.

Mr. Warren stated in the opening paragraphs of his paper that although a paper on "Backfilling Trenches," which he had presented at the A. S. M. I. convention six years ago had been well received and had been widely circulated, it was extremely doubtful if it had "resulted in any reform in the long established general custom of letting the trenches 'settle' themselves." It was certain, he said, that the careless method still prevailed, and that it was still common to see the results of "settled" pavements, laid over carelessly filled trenches, from six months to twenty years after the laying of the pavement; and he expressed doubt if any real reform would follow anything which could be said or written short of the "enactment of a law making it a criminal offense for an engineer to make specifications or inspect work, or for contractors to construct work in such a manner as will permit of subsequent settlement of trenches or other fills in road construction."

As an example of the results of improper settlement, Mr. Warren quoted a news item concerning certain work in which a fill to carry a road was not allowed to settle before the surfacing improvements were made, with the result that it became necessary to do over much of the work for which more than $750,000 had already been spent. The fill had sunk two feet and the expensive surfacing work on the street had been ruined. The settlement was due to the placing of several hundred thousand cubic yards of filling in one year and then completing the work without allowing the embankment time to settle. This case, Mr. Warren said, differed from thousands of others occurring nearly every day only in magnitude, and he stated further that it apparently never occurred to anyone to provide that the work be done in such a manner that there could be no subsequent settlement, even if such care required the expenditure of a little more money.

To show that fills could be made without allowing them time to settle naturally and with no danger of settlement after pavements were laid over them, Mr. Warren cited work done by him in Utica, N. Y., something over twenty years ago in the building of an embankment about 500 ft. long, 50 ft. wide and of a maximum depth of about 6 ft. This embankment carried a roadway across a ravine about 75 ft. deep —the bed of a very nearly extinct branch of the Mohawk River which extended through the city. As the city grew toward it, this ravine was used as the dumping ground for the city and was filled with ashes, tin cans and other refuse,

IMPROPERLY BUILT FILL ABOUT 20 FT. IN DEPTH AND ABOUT 45 FT. IN WIDTH.

VIEW ON TOP OF FILL SHOWN IN ILLUSTRATION OPPOSITE—SHOWING EFFECTS OF SETTLEMENT.

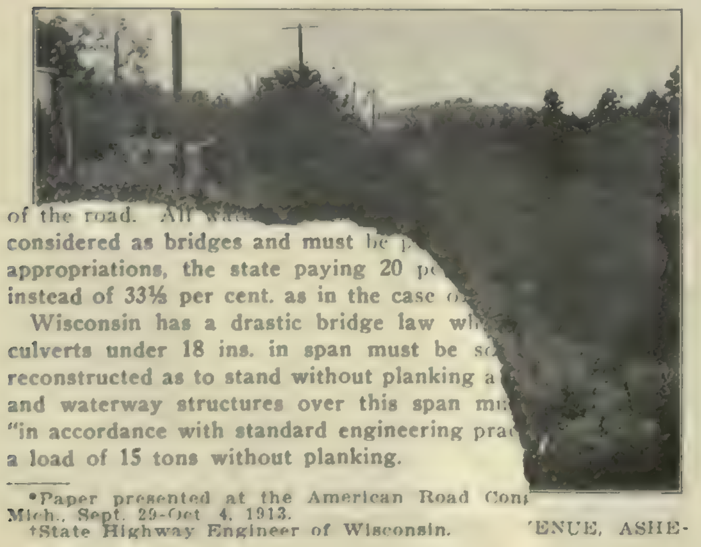
which, although not proper material for a fill, was placed so gradually that it had been compacted and at the time the road was built across it had been brought up to within about 6 ft. of the proposed subgrade of the roadway. The embankment placed on top of this was made by hauling in the material, spreading it in layers about 6 ins. deep and thoroughly rolling it, dampening the earth slightly with the watering carts at such times as it was too dry to pack.

Another example cited by Mr. Warren was the construction of a pavement on French Broad Avenue in Asheville, N. C., in 1904. Both the grade and alignment of the street were materially changed and heavy cuts and fills were made necessary, the roadway over its entire width being raised about 6 ft. in some places and in other places sidehill fills, 10 ft. wide and 30 ft. deep, being built. Again in this case, the material for the fills was deposited in layers and thoroughly rolled during the construction, a 10-ton steam road roller having been lowered to the bottom of the ravine for the purpose. In the case of this fill, as in the case of the one in Utica, there was no settlement.

Another example given by Mr. Warren illustrated the trouble arising from improper settlement. In this case the work was in connection with a street improvement in which the author of the paper was interested only as a sub-contractor laying the pavement. A sidehill embankment was necessary and the specifications required that it be made in 6-in. layers, thoroughly rolled. The general contractor, with the approval of the engineer, built a construction track at the top and made the fill by means of dump cars—very cheaply but with expensive results. After the completion of the fill, the foundations and the curbs, but before the wearing surface of the pavement was laid, heavy rains came and the fill slid several feet toward the bottom of the ravine.

In 1908, the Warren company was the contractor for the paving of a street where the conditions were much the same as those just described except that the lowering of a roller and the building of a wagon road to the bottom of the ravine were more difficult matters. These steps were taken, however, and the work prosecuted in the proper manner, with the result that the pavement was constructed immediately after the construction of the fill and no settlement has occurred since.

In conclusion, Mr. Warren stated that it was his conviction that wherever fills were necessary in highway work, whether for the filling of trenches or the building of embankments, economy and efficiency demanded that the work be done so that there would be no subsequent settlement. If, he said, engineers would not only draft specifications in such a manner as to provide for such performance of the work, but would also see that contractors fulfilled those specifications they would bring about one of the useful reforms in connection with road construction.



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BITULITHIC PAVEMENT ON FILL SHOWN IN ILLUSTRATION OPPOSITE—NO SETTLEMENT.

The Question of Federal Aid

By **MAJOR W. W. CROSBY**[*]

Under the title of "National Aid for Building Roads," "Good Roads" has editorially referred to a subject of the greatest interest to all. The writer appreciates so keenly the statements made and so heartily agrees with them that he is led to offer the following as his personal views in the matter and for such general consideration as they may attract.

The time seems ripe for something to be done—and it seems that it should be done quickly—to insure safe and sane consideration of that vast question, the matter of financial aid by the national treasury toward road improvement. As stated, bills to a large number have been introduced in Congress—a Congressional committtee has been appointed in the matter, and one unfortunate bill appropriating half a million dollars from the treasury has already been passed. The writer uses the term "unfortunate" advisedly because he believes that the appropriation was most inopportune; that the principles on which the appropriation was made are not yet established and need much more examination and testing before they can be widely accepted; that there is grave danger that from this spore so planted a noxious growth of overwhelming effects may develop, and that the far wiser course would have been to have made and used this appropriation for purposes of competent and thorough investigation into the whole matter rather than for actual road work now under the principles of the act, largely, it seems, for the personal benefit of a relatively few individuals.

In January, 1912, those ardent advocates and workers for road improvement—the motorists—held a set of well attended meetings in Washington for the avowed purpose of furthering federal aid to road improvement. It developed that many conflicting ideas on the subject existed and that many interested were as yet uncrystallized in their thoughts of the matter. The convention was urged by the most eminent members of Congress who attended to "get together" on some scheme and then to submit it in the form of a bill.

The wiser heads appreciated the value of this advice, the vastness of the subject and its ramifications, and taking counsel did an eminently wise thing. They did not attempt to frame a bill for federal aid but they framed a set of resolutions providing for a thorough and competent investigation of the subject, and these resolutions were adopted by the convention.

To this end, a bill has been prepared which provides for a competent commission to be appointed, clothed with the necessary authority and provided with sufficient funds for its purposes. As yet, however, the advancement of any bill along this line toward its enactment into law has not been perceptible. Time will undoubtedly be required for overcoming hostile prejudices and interests. In the meantime, one act (as before referred to) has been passed, and the passage of others threatens.

Why does not now, in the public interest, the American Road Builders' Association apply its energies and resources on the following lines?

First, to prevent further unfortunate legislation until better information on the subject is had and digested.

Second, to collect and concentrate public sentiment to the passage of the bill providing for a competent commission to secure and digest the available information and then to recommend a future policy for the government in the matter.

Third, to "take Time by the forelock" and, pending the passage of the act providing for the commission, to perform such work as may be of material aid to the commission when the latter may have been established.

Preliminary to any actual work of investigatory surveying, collecting of data, etc., by a commission, would naturally come the desire by the commission for hearing the views of those who had already given more or less thought to the subject. In the expression of these thoughts would probably appear statements that would attract investigations or suggest such. By securing as a preliminary to its work much of this interchange of views, any commission could begin its work more understandingly and with more momentum.

It seems to the writer that the American Road Builders' Association can do valuable work in beginning at once to collect, collate and, as far as possible, harmonize the various views now held in the matter.

Again, if it be assumed that such a commission as has been referred to is not likely to become established in season for the necessary consideration preliminary to the law making, what will be the situation?

The work of the American Road Builders' Association on the lines suggested will then be all the more valuable because, if not by a commission, the consideration will likely be had by an unorganized portion of the general public—that is to say, not at all sufficiently; by a Congressional committee, or by an organized association properly representative of the country at large.

If the digestion of all the ramifications of this important subject be left to no one in particular, it may safely be assumed that not only will time be lost, but also that when results are reached, they will be sadly and unwholesomely colored by special interests. No one surely will advocate thus leaving this matter to chance.

If the consideration is had by a Congressional committee, the other demands on the time of its members will unquestionably result in their leaving most, if not all, of the preliminary work and even some of the work more advanced toward the final result, such for instance as the outlining of a bill, to a few of the members specially interested in the matter, and even these members, or a majority of them, are not likely to be men experienced in road administration, economics, engineering or execution. Hence they in turn will rely largely on certain individuals or officials for guidance and these latter may quite likely be unfortunately prejudiced on certain lines because of their peculiar circumstances. A study of conditions under such auspices would probably result in an incomplete or colored recognition of facts; of incorrect deductions; the assumption of untrue principles, and perhaps the presentation of a bill for passage by Congress which would injure materially the cause of general road improvement through the country at large. It is, of course, unnecessary to dilate on the dangers of an improper bill so presented, with its momentum acquired from its source and backing, or on the difficulties of the changing of such a bill into the most perfect act.

It seems that consideration of the subject by a proper association is not only most proper, but also most likely to produce the best results. Through such an association may be had sufficiently general representation of all interests; sufficient contribution of facts from which correct conclusions may be drawn; restraint against incorrect deductions from facts; wisdom in formulating principles; skill in framing a bill on the proper basis; ability for demonstrating its value, and support for urging its enactment into law. "In multitude of counsellors there is safety," and surely this will apply in this case to a properly organized association. Such an association will naturally contain the representatives of the special interest previously referred to, but, on the other hand, any pernicious tendencies of such will be neutralized by the presence of opposing interests. Then, too, selfish interests would have to run the gauntlet of an unselfish majority were the former personal, official, bureaucratic, or even departmental, lay or professional. Further, through such an association, it would be easily possible to secure the highest quality of expert advice from all the official, professional, trading, manufacturing, transporting, traveling, consuming and producing interests involved.

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[*] Consulting Engineer, Baltimore, Md.

The widespread interest already awake to the importance of road improvement; the constantly increasing agitation to augment that interest by results, especially in the matter of national aid, so called; the flood of bills, more or less well conceived, already introduced in Congress; the vast difference in such bills; the positions taken by Congress in this and related matters; the probabilities of some definite actions by Congress in the comparatively near future, and the experience and character of the American Road Builders' Association, convince the writer that this association is the proper body to take up the consideration of this important subject; that it should not delay in so doing, and that it should, as is, of course to be expected, proceed thoroughly, and as rapidly as consistent with safety to accumulate facts and opinions and to discuss and formulate such a bill for federal aid toward highway improvement as will result eventually in its early passage by Congress and the greatest ultimate good to the whole nation.

It does not seem to the writer to be the wisest course at the present to leave the consideration and action in this matter to the American Automobile Association alone, well equipped as the latter may be along certain lines. His reasons for this conclusion may be had more fully by referring to the September issue of "Good Roads" for 1908, page 302, wherein they were set forth in detail. Suffice it to say here that he thinks unfortunate prejudices existing in many minds against the automobile, or its users, might then hamper the work toward the deserved end, and that faster progress and less friction will be had through another agency.

The American Road Builders' Association seems well organized and equipped for carrying on the work in question, i. e., a thorough investigation of the subject by unprejudiced and competent representation from all interests and from all sections of the country, and, as constituted, should be able to present results which should carry great weight everywhere and be generally accepted as conclusive.

It seems doubtful if as broad consideration of the subject by a more widely representative body could now be had through any other association competent to pass on the matter.

An Election in Multnomah County, Oregon, will be held Nov. 4 to decide the question of issuing bonds to the amount of $1,250,000 for the purpose of building a bridge across the Columbus River.

The County Commissioners of Hillsboro County, Fla., are advertising for bids for $500,000 of the $1,000,000 bond issue recently authorized by the voters of the county for the construction of brick roads. Bids will be opened at the November meeting of the board.

Motor Buses In and Around London owned by the London General Omnibus Co. now number 2,500, according to figures recently made public. The modern motor bus is a 35-HP. machine which is said to run much more quietly than some of those formerly in use. Until lately the machines were purchased abroad, but they are now manufactured in England and are built according to standards which have been adopted on the assumption that the experimental period in the construction of these vehicles has passed.

Motor Vehicle Regulation in Massachusetts

In connection with the address made by Col. Wm. D. Sohier, Chairman of the Massachusetts Highway Commission, at the Thursday afternoon session of the recent road congress at Detroit (referred to elsewhere in this issue), it is of interest to note the provisions of the law regulating heavy motor vehicle traffic to which he referred.

The law, which is designated as "an act relative to the operation of traction engines, motor vehicles and other vehicles upon highways and bridges" (Chapter 803, Acts of 1913), was passed at the last session of the Legislature and approved on June 14, 1913. It provides that no traction engine, trailer, motor or other vehicle having a total weight exceeding 14 tons, including the vehicle and load, shall be operated on any highway or bridge in any city or town in the state without a permit obtained from the Highway Commission, the county commissioners, the superintendents of streets, the selectmen or other road authorities. It also provides that no vehicle having on its wheels flanges, ribs, clamps or other objects which will injure or cut into the surface of the hignway or bridge for any considerable depth shall be operated upon the road. The use of heavy motor vehicles is still further restricted by a clause forbidding the operation of vehicles bringing upon the surface of a highway or bridge a weight exceeding 800 lbs. per inch width of tire without obtaining a permit unless the highway or bridge is paved with "brick, block, sheet asphalt, concrete pavement or surface." In case a vehicle bringing upon the roadway a greater weight than this does damage to the road or bridge, the owner or driver of the vehicle, unless relieved from liability by his permit, is held responsible for the damage; and the authorities in charge of the highway or bridge may recover from him.

The speed of steam traction engines, with or without trailers, and motor trucks carrying a weight exceeding 4 tons, including the vehicle, is limited to 15 miles an hour, and that of similar vehicles carrying more than 6 tons to 6 miles an hour when such vehicles are equipped with iron or steel tires, and 12 miles an hour when equipped with tires of hard rubber or other similar substance.

Permits for the operation of vehicles bringing upon the road a weight exceeding 14 tons or bringing upon the surface of a bridge or highway a weight exceeding 800 lbs. per inch width of tire may be granted by the Massachusetts Highway Commission, by the county commissioners, by the superintendents of streets, by selectmen or other road authorities having charge of the repair and maintenance of highways and bridges. These permits may be general or they may be limited as to time and as to the roads or bridges which may be used. They may also contain any special conditions or provisions deemed necessary by the issuing authorities.

Local authorities are also authorized to make regulations limiting the speed over bridges of the vehicles referred to in the act to not exceeding 6 miles an hour, provided that notices to that effect are posted at both ends of the bridge and that the load capacity of the bridge is stated in the notices.

A penalty of a fine of not more than $100 for each offense is provided for volation of the act. It is provided that the fines shall be paid into the state treasury for use on state highways or bridges when state highways or bridges are injured; and into city, town or county treasuries when highways or bridges under the jurisdiction of those units are injured, the funds in this case being used for highway work in cities, towns or counties where the damage was inflicted.

The City Council of Los Angeles, Cal., has approved the assessment map for the proposed improvement of Moneta Ave., between Slauson and Manchester Aves. It is estimated that the cost of the improvement will be between $300,000 and $400,000.

Brick Road Construction

A description of the work done in Cuyahoga County, Ohio, in the construction of brick roads, and an exposition of the methods to be employed in the proper construction of roads of that type were given in a paper entitled "Brick Road Construction," presented by James M. McCleary, Road Engineer of Cuyahoga County, at the road congress held in Detroit, September 29 to October 4.

The first part of the paper consisted of a description of the development of the brick pavement in Cuyahoga County. This county, in which the city of Cleveland is located, is a section where brick pavements have been used very extensively and where excellent results have been secured in their construction. In his paper, Mr. McCleary pointed out that satisfactory results were achieved slowly and only after many failures in the early road work of the county. He said that the construction of the first brick road in the county was commenced in 1893 and finished in 1895. The wearing surface was 8 ft. in width; tar was used as a filler, and the foundation consisted of 6 ins. of broken stone. No provisions were made for drainage, and there were practically no specifications. Under the action of travel, water and frost the pavement went to pieces, and, as the law under which it was built provided for no expenditure for maintenance—until the law was amended in 1898, five years after the construction of the pavement—the chief value of the road, according to Mr. McCleary, was as a "horrible example." Other work described in the paper illustrated the successive forward steps in brick construction.

The remainder of the paper dealt with the details of the methods of construction now followed in building brick pavements. These methods, as set forth by Mr. McCleary, are essentially as follows:

The drainage of the graded portion of the road is important, and the plan adopted should be the one that will most nearly maintain the substructure free from moisture below the frost line. Common practice provides for the use of a very heavy roller, upon the theory that the soil should be compacted to as great a depth as possible. This will do no harm, but the chief purpose of rolling is accomplished when the weak or spouty places in the soil are revealed so that the engineer can treat them as he sees fit, and for this purpose a roller weighing from 8 to 10 tons answers every requirement.

Preceding the final preparation of the subgrade, the curbs must be placed. In most of the rural work in Cuyahoga County these are put down flush with the surface of the completed pavement.

Curbs having been set and the subgrade prepared, the next step is the placing of the concrete foundation, which in Cuyahoga County has been 4 ins. in depth. A 1:3:5 mixture, with a permissible variation according to the size of the aggregates which will most nearly fill the voids, meets every requirement.

While too much stress is perhaps laid on the ability of a sand cushion to afford resiliency or absorb the shock effect, it is unquestionably necessary for bringing the wearing surfaces of the bricks to a perfect plane by neutralizing the unevenness and lack of uniformity of the brick. It is also necessary to compress and bring to a like density every part of the sand cushion. To secure this it is best to spread the sand entirely by shovels, then roll, strike off and re-roll; and repeat this the third time if necessary. This brings the cushion to a condition of compactness and even density that will not only furnish uniform support to the entire pavement, but will prevent the sand from flowing up between the joints in the brick when the latter are rolled.

The bricks should have lugs on the sides and grooves on the ends, and the percentage of loss tolerated as a maximum in the rattler test should be determined by the class of traffic which the pavement is to carry. In laying the bricks, first see that the lugs are all turned one way; second, make certain that the joints are broken so that one-third or more of the bricks of one course overlap the bricks of the next course; third, be sure that every fourth course is driven up to a straight line, and, fourth, for the sake of appearance, keep the line of the brick at right angles with the curb. Care should be taken to see that all soft bricks or bricks that are burned too hard are removed and that those so heavily kiln marked as to cause unevenness in the pavement are turned. Caution should be exercised in this, for many kiln marked bricks are thrown out which if allowed to remain would be of more value to the pavement than others that are retained.

After the bricks are placed in this manner their unevenness should be removed by the use of a roller weighing not over 5 tons. If a horse roller is used it should have a diameter of at least 5 ft. The rolling should be begun on one side and carried on parallel to the curb, the roller returning over the same course as was covered on its first trip. The next trip should overlap the first, the roller again returning over the same course, and this should be continued until the center of the pavement has been reached, when the roller should be moved to the opposite curb and the pavement rolled as before, until the center is reached. The roller should then start at one side and work diagonally across the pavement, this diagonal rolling having a tendency to bed the brick in such a manner as to avoid "rocker." The pavement should again be culled for broken brick, after which it should be hand rammed with a paving rammer weighing not less than 50 lbs., a plank not less than 6 ft. long, 10 ins. wide and 2 ins. thick, being interposed between the surface of the pavement and the rammer and laid parallel to the curb.

A grout filler should be used for the joints. The cement should meet the standard specifications for Portland cement adopted by the American Society for Testing Materials, and the sand used should be free from sewage, acid or soil and should be sharp and fine. A watertight box, standing on uneven legs so as to afford a "lower corner," should be used as a receptacle for the grout. In it should be placed not over one cubic foot of sand and a bag of cement, and the mass mixed until it assumes a uniform color. Water should then be added and the mixture stirred until it has the consistency of thin cream, when it should be applied to the pavement by means of scoop shovels, and thoroughly swept into the joints. After this has had sufficient time for setting, a second coat, slightly thicker than the first, should be applied. Later a third coat should be put on. This last coat should be worked with either an especially prepared broom or a rubber squeegee and should be swept across the joints at an angle of 45 degrees.

After the initial set has taken place the pavement should be covered with sand to a depth of about ½ in., and this should be kept saturated with water for at least five days. The pavement should not be opened to traffic for at least ten days.

Mr. McCleary stated that in Cuyahoga County no special provision against possible thermal effects, such as contraction and expansion, had been made, but reliance had been had mainly upon the condition of the structure by avoiding moisture underneath the roadway and by endeavoring to have the strongest possible cement filler. These provisions, together with a rigid curb, have enabled them to hold the expansion occurring in the narrow roadways. A few cracks have appeared in the pavement, but so far "they have not raveled out so as to injure the traffic worth of the road," nor have they been important enough to require repairs.

He stated that the fact that the roads were in condition for giving the maximum service during twelve months of the year and that they originated no dust had made them satisfactory to the owners of abutting property and others traveling over the roads. He stated further that the most eloquent praise of the roads was contained in the statement that although nearly four hundred miles had been built, 33 petitions were on file in the office of the county officials asking for 33 separate extensions.

Control of Sidewalk Construction and Maintenance

In a paper bearing the above title, presented by Secretary A. Prescott Folwell of the American Society of Municipal Improvements at the recent convention of that organization in Wilmington, Del., data on the methods followed in many American cities are given and the subject is discussed at some length by the author.

The data were secured from the different cities in answer to inquiries directed to the city engineers and other officials through the association's "clearing house" for the purpose of obtaining information requested by a member. Replies were received from 45 of the cities to which inquiries were addressed and Mr. Folwell has classified the methods reported into four groups, as follows: (1) Those in which the city does the entire work and, in most cases, charges all or part of the cost to the property owners; (2) those in which the matter is left entirely to the property owners, either without any inspection or with merely nominal supervision; (3) those in which the contractor is placed under bond, and (4) those in which the property owners are required to construct sidewalks when ordered and to make their own contracts for construction, the city engineer or similar official, however, being supposed to carefully oversee the work and to be responsible, to a certain extent, for it. Brief resumes of the replies are given by Mr. Folwell, the cities being grouped according to the classification of methods, as stated. The classification made by Mr. Folwell is as follows:

(1) Albany and Valdosta, Ga., Richmond, Ind., Asheville, N. C., Columbia, S. C., Aberdeen, Wash., Lethbridge, Alta., Victoria, B. C., Winnipeg, Man., Hamilton, Ont., one city in New York and one in New Jersey.

(2) Birmingham, Ala., Norristown, Pa., Pawtucket, R. I., Fort Worth, Texas, Quebec, P. Q.

(3) Pine Bluff, Ark., Decatur, Ill., Ames, Ia., Kalamazoo, Mich., Grand Forks, N. D.

(4) Fort Smith, Ark., Santa Barbara, Cal., Moline, Ill., Indianapolis, Ind., one city in Iowa, Atchison and Manhattan, Kan., Grand Rapids and Holland, Mich., Kansas City, Mo., East Orange, N. J., Binghamton, N. Y., Wilmington, N. C., Lima, Ohio, Wilkes-Barre, Pa., Charleston, S. C., Austin and San Angelo, Tex.

Mr. Folwell's concluding discussion follows:

"In comment upon these replies, the author would call especial attention to the arguments in favor of the method first described—that of treating sidewalk work in the same way as roadway work; and this method of treatment should, in his opinion, apply to the designing and general control as well as to the mere construction. By this he means that the material to be used and the time of construction should be determined by the department of highways or city engineer, and that the work should be put in an entire block at a time and not piecemeal.

"It seems to us inevitable that most of the highway construction which is performed in small sections scattered over the town cannot receive as effective supervision by the city engineer as could a few contracts each covering an entire block or more. There certainly would seem to be little question that construction in 25-ft. or 50-ft. sections must be quite a little more expensive and in many respects less satisfactory than if the entire block were constructed at one time. In addition to this, even where the work is well done, the patchy appearance of a street where old and new sidewalks alternate, and indeed where brick, flag and concrete may all be found in one block and in various stages of repair, is far from pleasing to the eye and is unpleasant for the pedestrian.

"The sidewalk is as fully a part of the public highway as is the roadway, so far as its use is concerned. It is as free to the general public and is (or should be) no more used for private purposes by the abutting owner, and we can therefore see no reason why the two should receive different treatment.

"As a matter of fact, in too many cases little attention is paid to the sidewalk. Volumes are written about roadway pavements, but only an occasional page about sidewalk paving; but yet to one person who uses the roadway there are probably ten who use the sidewalk. The additional property right or quasi-ownership which in some cities is held by the abutting owner over the sidewalk need not interfere with the municipal control any more than they interfere with roadway paving in those states or cities where such ownership is construed as extending to the center of the highway.

"And the logic of the argument would include also maintenance, including street cleaning. In German cities the street cleaning gang cleans the sidewalks as well as the roadway, in many cities flushing them down with hose during the night at the same time that the roadway is similarly treated. In large cities a considerable proportion of the dirt on the sidewalks is blown there from the roadway, and the remainder is carried or thrown there by the public at large which uses the sidewalk (except for store sweepings or other dirt thrown from the abutting premises in violation of the city ordinances). It would therefore seem to be as much the city's business to remove this dirt from the sidewalks as to clean the roadways. An additional argument in favor of this is the fact that the dirt from the sidewalk is very apt to be blown or swept on to the roadway shortly after the latter has been cleaned, thus to some extent undoing the work of the street cleaning gang. This would not occur were the entire street, from property line to property line, cleaned at one operation.

"Considering, however, merely the point of view of the cost of sidewalk construction, there would seem to be little reason to dispute the following statements: First, an improperly constructed sidewalk will be more expensive in the long run in that it must be renewed more frequently than one properly constructed. Second, inspection adequate to securing proper construction is very expensive when the work is done in small jobs of 25 or 50 ft. Third, construction in such small jobs is more expensive to the contractor and consequently to the property owner or city. Fourth, not only would it appear reasonable, but it has been demonstrated by experience, that the lowest prices can be obtained for sidewalk work by letting the contract for the work of an entire season to one or two contractors, with the understanding that no stretch of work of less than a block will be ordered."

AMERICAN ROAD BUILDERS' ASSOCIATION

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Through the courtesy of the publisher of "Good Roads," this page, each month, is devoted to the use of the American Road Builders' Association. It is solely in the interests of the Association, and it is the desire of the Executive Committee that all members feel that this space is their own, and that they contribute freely to it, not only as regards anything concerning the Association itself, but also that which will further the good roads movement. Besides the official announcements of the Association, there will appear on the page contributions by members, items of news concerning the Association activities and personal notes about its members. All contributions should be sent to the headquarters of the Association at 150 Nassau Street, New York, N. Y.

Executive Committee:
Geo. W. Tillson
R. A. Meeker
E. L. Powers

THE TENTH ANNUAL CONVENTION

Although over a month has yet to pass before the Philadelphia convention of the Association, it is already evident that the calling to order of the meeting on the forenoon of December 9 will mark the opening of the most successful of its long series of notable conventions. The program prepared and the speakers so far selected promise technical sessions of unusual interest and value; applications for exhibition space already received show that the exposition of road building machinery and materials will be the most complete ever assembled, and the widespread interest being taken by officials, engineers and contractors connected with road work indicates an attendance of actual road builders larger than has ever been present at a similar meeting.

As previously noted on this page, the technical sessions will be arranged in much the same manner as last year and the year before. The general subject of highway work is to be considered under three heads—organization, construction and maintenance. The particular phases of each of these subdivisions will be covered by papers presented by men chosen because of their training and experience, and the presentation of each paper will be followed by a discussion by several especially selected speakers and then thrown open to the meeting. The tentative program printed in this column in the October 4th issue has been changed to some extent since that time, and the present program—in which little, if any change will be made—is as follows:

Subject A.—Organization

1. Highway Officials, Their Duties and Powers.
   Paper
   Discussion
2. Division of Expense, Responsibility and Authority Between Nation, State, County and Town.
   Paper
   Discussion
3. The Relation to Each Other of the Contractor, Engineer and Inspector.
   Paper
   Discussion
4. Details of Arrangements for the Use of Convict Labor.
   Paper
   Discussion

Subject B—Construction

1. Determination of the Amount of Realignment, Grading and Drainage to Be Done in Connection with Road Improvement.
   Paper
   Discussion
2. Factors Governing a Proper Selection of Road or Street Pavement.
   Paper
   Discussion
3. Details of the Construction of the Various Kinds of Roads and Pavements.
   Ten minute papers on the following subjects:
   Earth Roads; Sand-Clay Roads; Gravel Roads; Water Bound Macadam; Bituminous Macadam and Bituminous Concrete; Brick; Concrete; Wood; Granite and Asphalt Block; Sheet Asphalt.
4. Unit Price and Lump Sum Contracts and Percentage Work.
   Paper.
   Discussion.
5. The Testing of Material for Road and Street Construction.
   Paper
   Discussion

Subject C.—Maintenance

1. Sub-Organization for Securing Efficient Maintenance.
   Paper
   Discussion
2. General Methods of Repairs and Renewals.
   Paper
   Discussion
3. Bituminous Surface Treatment and Dust Prevention.
   Paper
   Discussion

Among those who are to take part in the proceedings, either by reading papers or in discussions following the presentation of papers, are the following: Chas. J. Bennett, State Highway Commissioner of Connecticut; E. M. Bigelow, State Highway Commissioner of Pennsylvania; A. H. Blanchard, Professor of Highway Engineering, Columbia University, New York, N. Y.; Henry L. Bowlby, State Highway Engineer of Oregon; Frank W. Buffum, State Highway Commissioner of Missouri; John N. Carlisle, State Highway Commissioner of New York; Wm. H. Connell, Chief, Bureau of Highways and Street Cleaning, Philadelphia, Pa.; Geo. W. Cooley, State Engineer of Minnesota; F. L. Cranford, Road Contractor, Brooklyn, N. Y.; Major W. W. Crosby, Chief Engineer, Maryland Geological Survey; A. W. Dean, Chief Engineer, Massachusetts Highway Commission; Fred E. Ellis, Road Contractor, Peabody, Mass.; A. B. Fletcher, State Highway Engineer of California; S. D. Foster, Chief Engineer, Pennsylvania State Highway Department; R. B. Gage, Chemist, State Highway Department of New Jersey; John

S. Gillespie, Road Commissioner of Allegheny County, Pa.; L. R. Grabill, Superintendent of Suburban Roads, District of Columbia; H. C. Hill, Engineer; Lane Construction Co., Meriden, Conn.; A. R. Hirst, State Highway Engineer of Wisconsin; Prevost Hubbard, Consulting Chemist, Institute of Industrial Research, Washington, D. C.; Jos. W. Hunter, Deputy Commissioner, Bureau of Township Highways, Pennsylvania State Highway Department; A. N. Johnson, State Highway Engineer of Illinois; C. A. Kenyon, President, Indiana Good Roads Association; Nelson P. Lewis, Chief Engineer, Board of Estimate and Apportionment, New York, N. Y.; James H. MacDonald, former State Highway Commissioner of Connecticut; T. H. MacDonald, State Highway Engineer of Iowa; W. A. McLean, Chief Engineer of Highways and Commissioner of the Ontario Public Roads and Highways Commission, Toronto, Ont., Canada; R. A. Meeker, State Highway Engineer of New Jersey; Harold Parker, Vice President, Hassam Paving Co., Worcester, Mass.; Robert J. Potts, Professor of Highway Engineering, Agricultural and Mechanical College of Texas, College Station, Tex.; Dr. Joseph Hyde Pratt, State Geologist of North Carolina; Jean de Pulligny, Engineer-in-Chief, Board of Public Works of France, and Director of the French Mission of Engineers to the United States; John J. Ryan, Secretary, Road Builders' Association, Albany, N. Y.; Frank F. Rogers, State Highway Commissioner of Michigan; Chas. W. Ross, Street Commissioner, Newton, Mass.; Paul D. Sargent, Chief Engineer, Maine State Highway Commission; Herman H. Schmidt, Chief Engineer, Bureau of Highways, Borough of Brooklyn, New York, N. Y.; Henry G. Shirley, Chief Engineer, Maryland State Roads Commission; Francis P. Smith, Consulting Chemist and Paving Engineer, New York, N. Y.; Robert C. Terrell, Commissioner of Public Roads of Kentucky; Geo. W. Tillson, Consulting Engineer to the President of the Borough of Brooklyn, New York, N. Y.; Wm. D. Uhler, Assistant Engineer, Bureau of Highways and Street Cleaning, Philadelphia, Pa.; P. St. J. Wilson, State Highway Commissioner of Virginia.

The exhibition, which will be the fifth of the series held in conjunction with the A. R. B. A. conventions, bids fair to be the largest and most complete exposition of machinery, materials and methods ever held in this or any other country. It will comprise machinery for road work and street paving, materials for roads and pavements, models illustrating methods of highway construction and maintenance, maps, charts and photographs, and a variety of eductional features. In addition to the usual commercial exhibits of road and street machinery and material manufacturers and dealers; it is planned to have interesting and instructive displays by states, municipalities and educational institutions, making, all together, a show full of interest to the layman as well as instructive and valuable to the builder of highways. The province of Ontario, Canada, will be represented by an exhibit.

Besides the technical sessions of the convention, there will be a popular session on Thursday evening, at which there will be addresses by well known public men who will discuss highway betterment in its less technical aspects. This is a departure from the usual method of conducting the conventions, and plans are being made for a meeting which will be of universal interest. Among those who are expected to speak at this time is Governor Lister of Washington, who has signified his intention to attend the congress.

Another innovation at the tenth annual convention will be an inspection trip over the city of Philadelphia on Thursday afternoon. This, besides providing a pleasant outing, will be arranged so as to offer excellent opportunities for inspecting the pavements of Philadelphia and such work as may be in progress at the time.

While the convention committee has been busy with the details of the convention and exhibition, the local entertainment committee has been making plans for the entertainment of the delegates, and although these are not wholly completed, several social and entertainment features have already been decided upon. One of these is to be a theater party given on Wednesday evening by the citizens of Philadelphia, who have invited the A. R. B. A. members and exhibitors to attend. Special attention is also being given to plans for the entertainment of the ladies who will be present. On Wednesday afternoon they will be given an automobile ride around the city, and plans for other entertainments are under way.

The Convention Committee consists of Samuel Hill, President of the A. R. B. A.; George W. Tillson, Third Vice President of the A. R. B. A.; R. A. Meeker, State Highway Engineer of New Jersey; E. L. Powers, Secretary of the A. R. B. A.; W. H. Kershaw, Manager, Paving and Roads Division, Texas Co., New York, N. Y.; Wm. H. Connell, Chief, Bureau of Highways and Street Cleaning, Philadelphia, Pa., and John A. Gaffey, General Contractor, Medford, Mass. The chairmen of the Local Convention Committees at Philadelphia are as follows: Press, Wm. H. Connell, Chief, Bureau of Highways and Street Cleaning; Reception: Honorary Chairman, Hon. Rudolph Blankenburg, Mayor, and Acting Chairman, Morris L. Cooke, Director, Department of Public Works; Entertainment, C. W. Bayliss, Manager, Road Department, Barber Asphalt Paving Co.

NOTES

Jos. W. Hunter, who has hitherto been designated as Deputy State Highway Commissioner of Pennsylvania, has been made Deputy Highway Commissioner in charge of the recently established Bureau of Township Highways.

Frank M. Williams, of Goshen, N. Y., has recently completed the preliminary investigations and plans for the improvement of 900 miles of highways in Portage County, Ohio, under the auspices of the Portage County Improvement Association.

G. Howland Leavitt, Superintendent of Highways of the Borough of Queens, New York, N. Y., was one of the guests of honor at a dinner given at the rooms of the Manhattan Automobile Club, 222 W. 59th St., New York, N. Y., on the evening of Oct. 11. The dinner was tendered to Borough President Maurice E. Connolly and Superintendent Leavitt as a tribute to the highway improvement work carried out in Queens during their administrations.

Edwin H. Thomes, Assistant Engineer in the Bureau of Highways of the Borough of Queens, New York, N. Y., who was one of the A. R. B. A. members attending the Third International Road Congress at London last June, has recently submitted to Maurice E. Connolly, President of the Borough of Queens, a report on his investigation of highway improvements in Europe. After the close of the congress Mr. Thomes spent several weeks studying highway matters in England and on the Continent.

James H. Sturdevant and Frederick S. Strong, both of whom are members of the A. R. B. A., are two of the three division engineers of the New York State Highway Department who retained their positions when the department was reorganized recently. Mr. Sturdevant is in charge of the fourth division, comprising the counties of Fulton, Hamilton, Herkimer, Madison, Montgomery and Oneida, with headquarters at Utica, and Mr. Strong is the engineer of the eighth division, comprising the counties of Alleghany, Chemung, Schuyler, Steuben, Tioga, Tompkins and Yates, with headquarters at Hornell. The amount to be expended in Mr. Sturdevant's division is $6,314,000 and that in Mr. Strong's division is $5,641,000.

LETTERS TO THE EDITOR

Action of the Automobile Wheel Upon the Road Surface

Editor, "Good Roads":

During the past few years much has been said about the action of the automobile on the road surface.* May I state how, in an elementary manner, I explain the matter to my class?

First, in Fig. 1, OB is a vector to represent that part of the weight of an automobile transferred to the ground through a drive wheel; OA, the horizontal push of the wheel against the ground for a given speed s, the reaction of which drives the machine forward—it is the force of friction between the wheel and the road surface; OC represents the resultant of these two forces in magnitude and direction, i.e., the total force of the wheel against the road surface. Since the resistance varies (very nearly) as the square of the speed, doubling the speed gives four times the resistance, trebling the speed, nine times the resistance, etc. In the figure, OD represents the resultant for speed 2s, and OF for 3s. As the speed increases the more inclined becomes the push of the wheel against the ground.

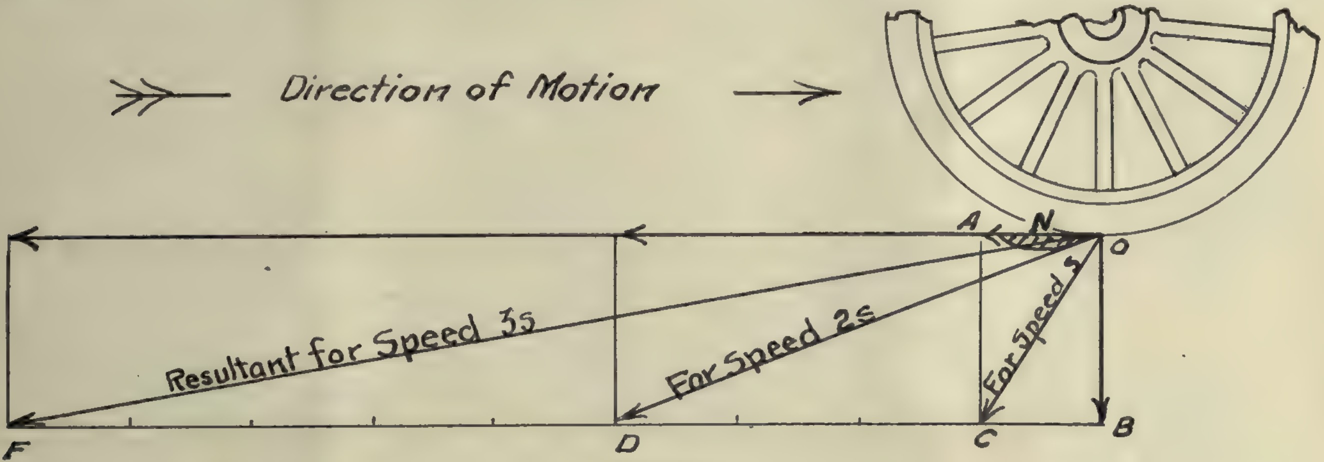

FIGURE 1.

Second, lay a sheet of writing paper on the table, as in Fig. 2. Place near one end of it a paper weight or hold it with the fingers of the hand. Hold a pencil, rubber end down, on the paper and perpendicular to it; push down. There will be no effect upon the paper. Now incline the pencil, as in Fig. 3, continuing to push. The paper buckles up in front of the pencil. The push along the pencil represents the resultant pressure of the automobile wheel, and whenever "shearing" stress in the road surfacing material becomes greater than its cohesive force, buckling takes place just back of the wheel (N, Fig. 1), the loosened particles being thrown out.

A little experimenting with the pencil will show that the greater the inclination—care being taken to keep the down-

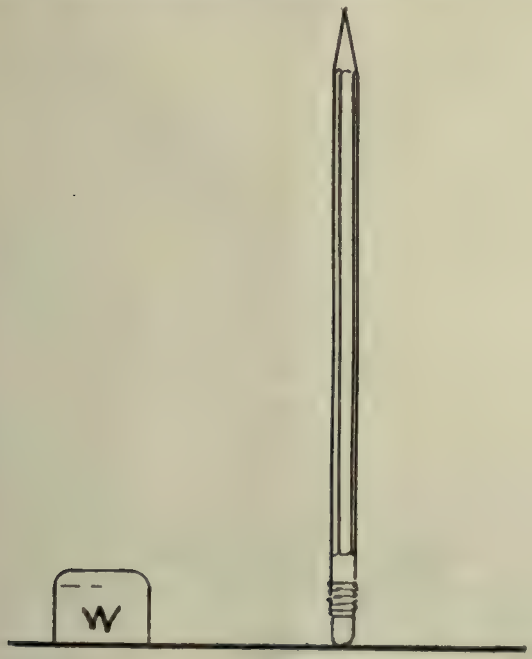

FIGURE 2.

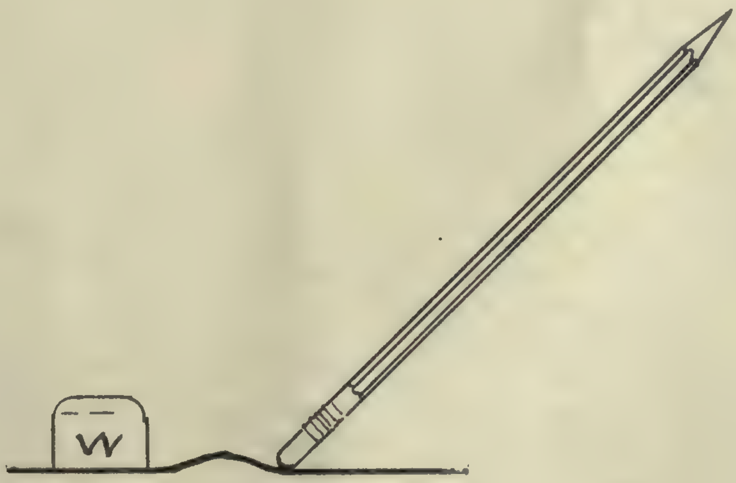

FIGURE. 3.

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*See article on same subject in the October 4th number of "Good Roads." ("Action of the Automobile Upon the Road Surface," "Good Roads," Oct. 4, 1913, page 172.)

ward pressure constant—the greater the shearing or buckling effect; so the faster the automobile travels the more inclined the resultant pressure and the greater the road is damaged.

GEO. R. CHATBURN,
Professor of Applied Mechanics.
Lincoln, Neb. University of Nebraska,

Convict Labor on Roads in Cayuga County, New York

Editor, "Good Roads":

For the past three months Cayuga County, N. Y., has been using in its road work a system that is unique. They have had men working on their roads without pay as a reward for good conduct. And they have been pretty good workers, occasionally a shirker, but after they have had some experience as at present, to any one visiting the work they will appear better than the average work gang.

Convict labor on roads is not a new thing by any means, but road work by convicts as a reward is.

With a population of 1,400 in Auburn Prison to draw from, five camps of sixteen men each have been established in five separate towns, and under the direction of the local highway official have been doing road work for three months. No convict is sent out unless he asks to go. No convict is sent out whose record is not good, and no convict is sent out who has more than one year more to serve. The applications to be sent out far exceed the number sent. There is almost always work for convicts inside the prison walls—in the prison shops and under a discipline necessarily strict. On the road work there is comparative liberty, after working hours companionship, games and music. Each of the five camps has produced its ball team and each one played against the local ball players. One guard is in charge of each camp and he is not even armed. The men are frequently out of his sight. They are required to ask his permission before going to the neighbors, to the woods or to the swimming pool, but that permission is frequently given. The situation is summed up in Warden Rattigan's lecture to the first camp, lined up at the prison before being sent out:

"You men have all asked to go. Do you still want to go? You will be expected to work but you will have more liberty than you have had inside. But you are still under prison rules. The same reward will be paid for you if you try to escape from the road, as it would from the prison, and the same punishment for it. I expect to hear good reports from you. Go on."

The prison provides the usual prison fare, the towns which are profiting by the men's labor supplement it with milk and butter, tobacco and some other luxuries, and furnish the dwellings. The sympathetic hearts of the good people of Cayuga County have also prompted them to send in, gratuitously, chickens, pies, cakes, etc., at frequent intervals. Fruit of all kinds is free up in Cayuga County anyhow—as much as you want to eat.

The men are perhaps half New York City men and at least half are under thirty years of age.

The work has comprised the building of four macadam roads, probably five miles in length; erecting four concrete and iron bridges; two grading jobs, and the building of one gravel road.

In concrete work the men were organized so that each had his part, and a man said to be the slickest check raiser in the country kept his end up on the mixing board. His time has since expired and he has gone to work for a farmer in the neighborhood. He is green to country life, but he has the brains to soon learn and it is said that he is giving satisfaction. Several other men have likewise found positions on farms, under parole.

In the macadam work each town is crushing its stone and the bulk of the work is handling stone to the crusher.

Some men have been returned to the prison, for impertinence to the guard, for absence without leave, for shirking, at their own request because they thought the work too hard, for sickness, for discharge and because sentence expired. Others have taken their places and been glad to do it. There was a man in the Victory camp whose sentence expired the next Tuesday. When I was there on Friday, he begged to be left out till Monday so as not to pass the long Sunday "inside." Much of the transferring in and out has been done by the County Superintendent's car. The camps are respectively 7, 9, 11, 22 and 24 miles from the prison.

Not a single attempt to escape has been made. There is an undercurrent of sentiment among the men that would make it unpleasant for any one who tried it, as they realize that escapes or misconduct would be likely to call them all in.

After three months the experiment can safely be called a success—a success for the towns who have benefited by the free labor on the roads and a success for the convicts themselves, in better fitting them to earn a living when their time expires and in giving them, by sympathy, by health and by stronger muscles, better courage for the task.

J. CHARLES DAYTON,
Superintendent of Highways,
Cayuga County, N. Y.
Auburn, N. Y.

Experiences in the Construction of Oiled Earth Roads

Editor, "Good Roads":

A few years ago the writer constructed an experimental block of oiled earth road which was partly a failure and partly a success. The road was in the residence section of Excelsior Springs, Mo., and was built in a gumbo soil. A study of the behavior of the road was made for a year or two with the result that from the lessons learned from it two miles of road, which have given entire satisfaction, were constructed at a very low cost.

The experimental block in the gumbo soil was built as follows: First the road was plowed to a depth of about 4 ins., the earth broken up and pulverized by means of a toothed harrow and a heavy timber drag. Next about 2 gals. of asphaltic oil, costing about 3¼ cts. per gal., on cars, was spread hot over the earth. Then the oil and earth were mixed by running a toothed harrow over the road several times, after which the road was dragged to make it smooth.

Trouble arose, however, when it was attempted to run a roller over the road, as the oiled earth pushed up in front of the roller; no better results were obtained with a light roller. The sight of the oiled dirt mess was discouraging but the road was finally gotten into presentable shape by hauling sand and gravel and spreading it over the surface in a sufficient quantity to allow the road to be rolled. The final result was that the 4-in. top which had been plowed up was pushed little by little by the travel into the gutter and carried away by storm water. The oil, however—and this is important—soaked into the hard and undisturbed subsoil and made an excellent roadway which was good at all times of year and under all weather conditions. The total cost of the experimental block, exclusive of sand and gravel, was 11 cts. per sq. yd.

It was learned from the experiment that the best way to construct oiled earth roads in the clay and gumbo soils in that vicinity was to put the hot oil directly on the hard dry road and let it soak in. Therefore, in constructing about two miles of road in a clay soil to be used for pleasuse driving and motoring and also for heavy hauling, the method described in the following paragraph was employed with success. The work was done during a dry summer month, the road having a good crown and being in a hard, packed condition.

First a disc harrow drawn by a team was run up and down the road a number of times. The disc cut grooves longitudinally along the road at close intervals. These grooves were about ¾ in. deep and 3 ins. apart. Next a light road grader was run over the road, the blade scraping the dirt from the grooves to the side of the road. Then heated asphaltic oil was spread over the surface at the rate of about 1 1-3 gals. per sq. yd. The grooves caught the oil (preventing it from running into the gutter) and gave it a chance to soak into the road. After giving the oil as long a time as possible to soak into the hard dirt, the road grader was again used to spread over the surface, in a thin layer, the dirt previously scraped off the road, in order to prevent the oil from adhering to shoes and vehicle wheels. Sand would be preferable wherever available.

The detailed cost of building 12,100 sq. yds. of oiled dirt road was as follows:

Asphaltic oil, 16,000 gals. at 2.7 cts., f. o. b. cars	$432.00
Harrowing with disc and moving dirt to gutter with blade	31.20
Cost of heating oil	32.75
Pumping oil from car into wagons, hauling and distributing	43.00
Total	$538.95
Cost per sq. yd.	4.45 cts.

The work cost more than it would have if it had not been a first job.

The two miles of oiled road were put in over two years ago and did not have a cent spent on them until late last spring when a small amount of oil was put on. During the two years of service the road was reported to be in excellent condition, summer and winter, rain or shine. When other adjoining roads were deeply cut up after rains the oiled earth road was in excellent shape.

The experience with the one block of experimental oiled road and the two miles of oiled road proves conclusively, to the writer at least, that where the soil is gumbo or clay the oiled dirt road should be built as follows:

In the spring or early summer grade up the road, giving it an ample crown. Provide proper ditches for carrying off storm water and let the traffic pack the road. When the road is dry and the weather hot apply the heated oil to the hard dirt and let it soak in. The road should be grooved to catch oil by running over it with disc harrow. Cover the oiled surface with a thin layer of dirt, or preferably sand, to absorb the surplus oil.

The writer has been informed that the success of the two miles of road has caused other districts in Missouri having gumbo and clay roads to adopt the method described for treating some of their roads, and that it has given good results. E. B. VAN DE GREYN.

Denver, Colo.

NEW PUBLICATIONS

VITRIFIED BRICK AS A PAVING MATERIAL FOR COUNTRY ROADS; By Vernon M. Peirce, Chief Engineer, and Charles H. Moorefield, Senior Highway Engineer, U. S. Office of Public Roads. Bulletin No. 23, U. S. Department of Agriculture; a Contribution from the Office of Public Roads, Logan Waller Page, Director. Paper; 6 x 9 ins.; 36 pp.; illustrated.

In this bulletin the authors have presented a treatise on the construction and maintenance of brick pavements, with especial reference to their use on country highways. In introducing the subject, the authors give a brief sketch of the development of brick paving, which is followed by a description of the materials used for paving bricks and of the manufacture of the bricks. Attention is also given to the physical characteristics of the materials and methods of testing. The illustrations include reproductions of photographs of brick paved roads, completed and under construction; drawings showing various features of brick pavement construction, and plans for the standard brick rattler.

THE STATE AID HIGHWAY LAW; Wisconsin Highway Commission, Bulletin No. 3. Paper; 6 x 9 ins.; 56 pp.

Included in this bulletin are an introduction tracing the development of the highway laws of the state and an explanatory notice relating to the construction of state aid roads in villages. The major portion of the book is taken up by the state highway law comprised in Sections 1317m-1 to 1317m-15, inclusive, of the statutes as amended by the Legislature of 1913. The various subdivisions of the law throughout the book are followed by explanatory paragraphs, considerably enhancing the value of the bulletin to the average reader.

SOUTH PHILADELPHIA; THE ABOLISHMENT OF GRADE CROSSINGS AND THE CREATION OF OPPORTUNITIES FOR COMMERCIAL AND INDUSTRIAL DEVELOPMENT. Issued by the Department of Public Works, Philadelphia, Pa. Paper; 6 x 9 ins., 72 pp.; illustrated; insets (tables and map).

The contents of this publication include a chapter on the history of the negotiations for the grade crossing abolishment in South Philadelphia, a statement by the mayor in regard to the work, a chapter describing the acquisition of railroad property for municipal piers, one on the revision of the street system for the development of property, many extracts from editorial comments on the work, and other information regarding the improvement. The illustrations show present conditions and proposed improvements, and the inset map shows the section of the city affected by the work and also the improvements planned.

REPORTS

BRITISH STANDARD SPECIFICATION FOR SIZES OF BROKEN STONE AND CHIPPINGS; Report of the Engineering Standards Committee, supported by the Institution of Civil Engineers, the Institution of Mechanical Engineers, the Institution of Naval Architects, the Iron and Steel Institute and the Institution of Electrical Engineers; Sectional Committee on Road Material; Leslie S. Robertson, M. Inst. C. E., Secretary, 28 Victoria St., Westminster, S. W. Paper; 8 x 13 ins.; 14 pp.

The Sectional Committee on Road Material was appointed in July of last year, and in November a subcommittee on Sizes and Nomenclature of Broken Stone was appointed. This report contains a preface by Col. R. E. B. Crompton, Chairman of the Sectional Committee on Road Material, reviewing the work of the committee; a list of the members of the Sectional Committee; a list of the members of the Subcommittee on Broken Stone; the specifications drawn up by the committee, and two appendices. The main part of the report consists of the specifications; the first appendix deals with apparatus for testing the gauge of broken stone and chippings, and the second appendix is devoted to the nomenclature of road stones.

BUSINESS METHODS IN MUNICIPAL WORKS: An Informal Record of the Operations of the Department of Public Works of the City of Philadelphia Under the Administration of Mayor Blankenburg. Issued by the Department of Public Works, City Hall, Philadelphia. Paper; 6 x 9 ins.; 64 pp.

This report, according to a notice appearing on the fly leaf, was not published at public expense but at the expense of a friend of good government. It is intended, according to a statement on the cover, as a progress report to make clear the difference between the operation of the Department of Public Works as an adjunct to a political organization and as a business proposition, and was written for the information of both the friends and the foes of progressive municipal administration. It consists of two parts, the first being an informal report in the form of an open letter to Mayor Blankenburg from M. L. Cooke, Director of the Department of Public Works, and the second annual report of Director Cooke for the year 1912. In the course of the report the organization of the department is discussed at considerable length, as is also the status of the employees of the department. Other matters given attention are educational work for employees; the discipline and discharge of employees; contracts, and the matter of consideration for and cooperation with the public in the conduct of the department's business.

EIGHTH ANNUAL REPORT OF THE STATE HIGHWAY DEPARTMENT OF OHIO; For the Year Ending November 15, 1912 Paper; 6¼ x 9¼ ins.; 276 pp.; illustrated.

This report, rendered by State Highway Commissioner James R. Marker to Governor Harmon of Ohio in November, 1912, contains a general statement of the work of the department and statements of the work of the Bureau of Construction, the Bureau of Maintenance and Repair, the Bureau of Bridges and the Testing Laboratory. There is also a chapter on the road materials in Ohio. The report of the work of the Bureau of Construction contains detailed statements of the type, number of mile, character and cost of the roads for which contracts were let by the state during the year covered by the report. The portion of the report dealing with the work of the Bureau of Maintenance and Repair contains, besides a detailed statement of the work, several pages devoted to a discussion of methods in general and those followed in Ohio. That portion of the report devoted to the Bureau of Bridges consists principally of a tabular statement showing bridges and culverts planned and approved during the year covered by the report and sample plans of bridge structures. In the laboratory report the several tests made at the laboratory are described in detail The chapter on road materials deals with the occurrence of various materials throughout the state. The report is profusely illustrated by halftones showing roads before, during and after improvement, typical bridges and culverts, and reproductions of photographs showing the occurrence of road materials in different parts of the state.

MEETINGS

Previously Reported.

(Issues of October 11, 18 and 25.)

AIR LINE HIGHWAY ASSOCIATION.—Organization meeting, Stamford, Tex. Page 194, Oct. 25.

AMERICAN HIGHWAY ASSOCIATION.—Third Annual Convention, Detroit, Mich., Sept. 29-Oct. 1. Page 182, Oct. 11.

AMERICAN SOCIETY OF MUNICIPAL IMPROVEMENTS.—Twentieth Annual Convention, Wilmington, Del., Oct. 7-9. Page 188, Oct. 18.

BAUDETTE, MINN.—Mass meeting, Oct. 4 Page 194, Oct. 25.

BLUE BOOK ROUTE ASSOCIATION.—Higginsville, Mo., Sept. 22. Page 186, Oct. 11.

COLORADO-TO-THE-GULF HIGHWAY ASSOCIATION, Mountain Division.—Organization meeting, Pueblo, Colo., Sept. 24. Page 186, Oct 11

COLORADO, TEX.—Organization meeting. Page 189, Oct. 18.

GRANITE FALLS, N. C.—Mass meeting, Sept. 26. Page 186, Oct. 11.

HATCHER SPRINGS, KY.—Barbeque and dinner, Sept. 25. Page 189, Oct. 18.

MOKELUMNE HILL, CAL.—Mass meeting, Oct 6. Page 194, Oct. 25.

MOREHEAD, KY.—Mass meeting, Sept. 20. Page 186, Oct. 11

MOUNT VERNON, N. C.—Bond election rally, Sept. 26. Page 189, Oct. 18.

NATIONAL HIGHWAYS ASSOCIATION, WEST VIRGINIA DIVISION.—Organization meeting, Oct. 8. Page 194, Oct 25.

ST JOSEPH, MO.—Property owners' meeting. Page 194, Oct. 25.

At a meeting held at New Braunfels, Tex., Oct. 15, the organization of the Comal County Good Roads Association was effected. The following officers were elected: President, F. G. Blumberg; Vice President, J. R. Fuchs; Secretary, P. F. Sussdorf; Treasurer, Walter Faust.

The Concho County Good Roads Association was organized at a meeting held recently at Paint Rock, Tex. The following officers were elected: President, O. L. Sims, Paint Rock; First Vice President, W. T. Molloy, Eden; Second Vice President, J. W. Norman, Paint Rock; Secretary, Hayne P. Young, Paint Rock; Treasurer, J. M. Patton, Paint Rock.

The Hays County Good Roads Club was organized at a meeting held recently at San Marcos, Tex. The club will cooperate in improving the Austin-San Antonio Highway, and will promote the calling of an election for the purpose of voting on highway bonds. The following officers were elected: President, S. R. Kone; Secretary, M. V. Raley; Directors, W. M. Stephenson, H. Brevard, G. G. Johnson, J. W. Earnest and Fred Hood.

COMING MEETINGS

Nov. 6-7.—Georgia-Carolina Good Roads Congress—Augusta, Ga. Secy., J. C. Harper, 511 Dyer Bldg., Augusta, Ga.

November 10-15.—United States Good Roads Association.—Convention, St. Louis, Mo. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

Nov. 20-22.—Alabama Good Roads Association.—Seventeenth annual convention, Mobile, Ala. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

December 9-12.—American Road Builders' Association.—10th Annual Convention, 4th American Good Roads Congress and 5th Annual Exhibition of Machinery and Materials, First Regiment Armory Bldg., Philadelphia, Pa. Secretary, E. L. Powers, 150 Nassau St., New York, N. Y.

February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary. Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

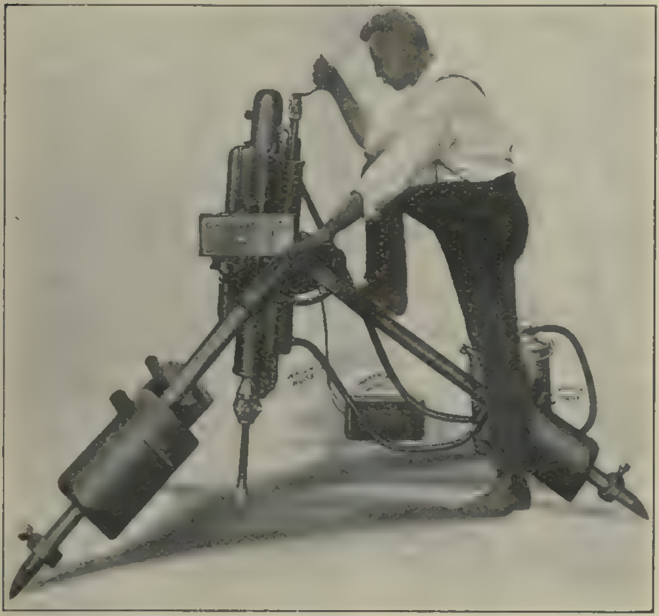
NEW MACHINERY AND APPLIANCES

Gasoline Rock Drill

A portable gasoline rock drill of a new type which has recently been put on the market and which may readily be applied to road grading work as well as to work in road material quarries is shown in the accompanying illustrations. One of the illustrations shows the drill, tripod and appurtenances in operating position, and the other shows a cross section through the drill.

The machine consists of the drill proper, the tripod, the fuel and lubricant container, the ignition battery and the water tank. The container for the fuel and oil is attached to the side of the drill and is adjustable with respect to the angle at which the drill is set. The battery and water tank are placed at convenient points near the machine. The drill, unmounted, and with wrenches and fittings, weighs 310 lbs., the tripod, without weights, weighs 275 lbs., and the holding down weights weigh 570 lbs.

The drill has four moving parts—the piston rod and pistons, a rifling nut, and two make and break spark plugs. The engine is of the 2-cycle type, with water cooled cylinders 3¼ ins. in diameter and with a 5-in. stroke. The piston rod runs entirely through the two cylinders, which are set end to end, carrying the bit chuck on the front and a piston for each cylinder. The make and break spark plugs on the two cylinders are tripped alternately by the pistons, the firing of the rear cylinder driving the piston forward and the firing of the forward cylinder driving it back. The drill, being carried directly on the piston, strikes the rock with the entire force given by the gasoline explosion. The cylinders are water cooled by means of a self-contained pump operating with the drill, and the lubrication is automatic. The normal speed of the machine is about 600 strokes per minute, but may be varied by the operator.



NEW RICE GASOLINE ROCK DRILL IN OPERATING POSITION.

A hole 24 ins. deep may be drilled without changing the bit, and the machine may be used for drilling holes up to 24 ft. in depth. The cost of operation is given by the manufacturer as $6.85 per day, the several items being as follows: Drill runner, $3.50; drill helper, $2.50; gasoline, 3 gals, 75 cts.; lubricating oil, 10 cts.

CROSS SECTIONAL VIEW OF DRILL.

The drill is the invention of John V. Rice, Jr., of Philadelphia, and is manufactured by the Rice Gasoline Rock Drill Co., Philadelphia, Pa.

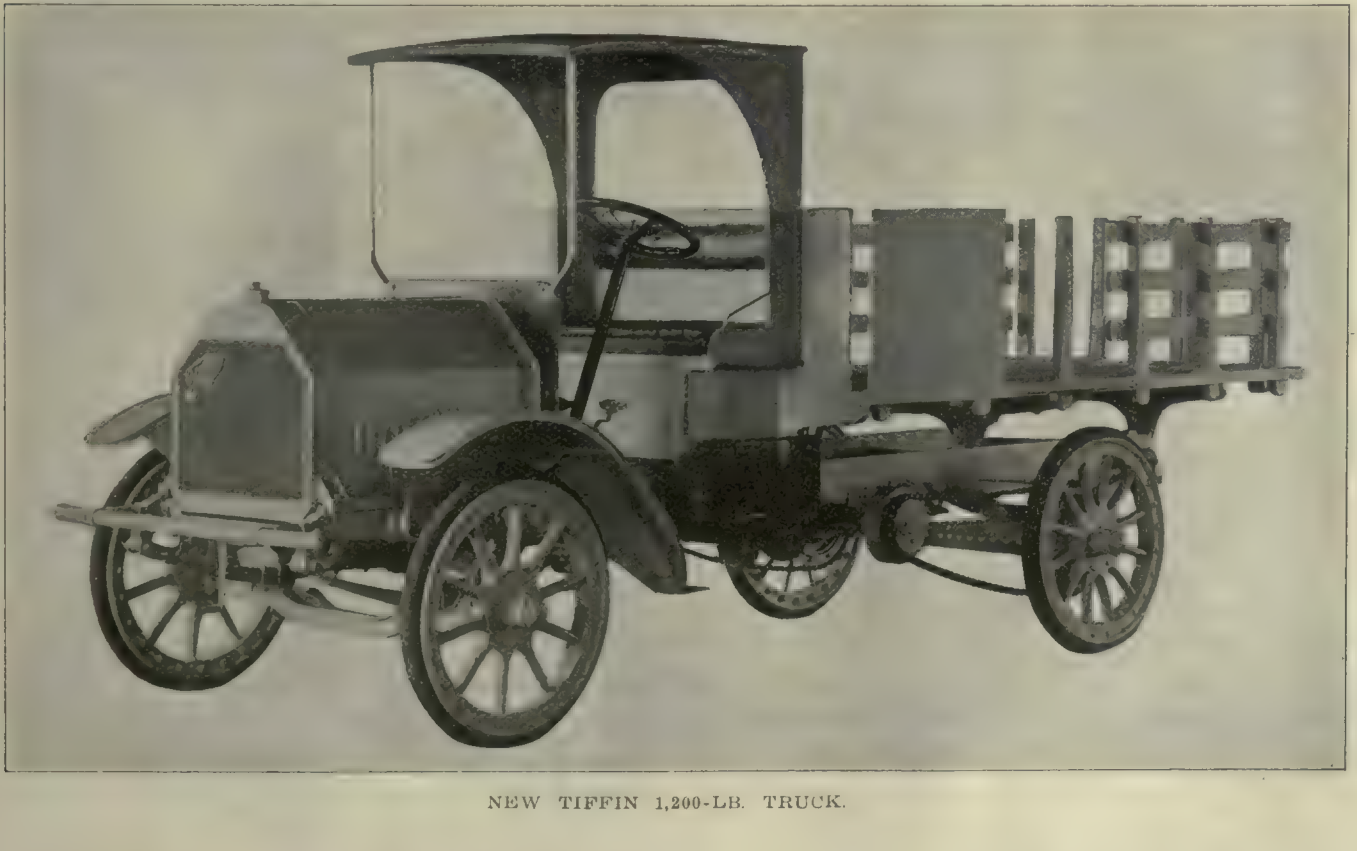
New Motor Truck

A new 1,200-lb. motor truck which has recently been put on the market is shown in the accompanying illustration.

The truck, which is designated as model A, is equipped with a 4-cylinder model M Buda motor. The motor is of the 4-cycle type with 3¾-in. bore and 4½-in. stroke and is rated at 25 HP. The lubrication is by force feed and splash systems and the ignition by Bosch magneto. The clutch is of the Hartford cone type, leather faced and provided with expanding springs, and the transmission is of the selective type with three forward speeds and one reverse. The drive is of the double chain type.

The brakes consist of two 2-in. by 10-in. foot controlled service brakes on the jack shaft and two 2½-in. by 12-in. emergency brakes on the rear wheels. The hand brake is operated by a hand lever and the speed change levers are located in the center of the car and are operated by the driver's right hand. The spark and throttle control are mounted on the steering wheel, and the car is also equipped with an accelerator operated by the foot.

The truck has a wheel base of 128 ins. and a tread of 56 ins., both front and rear. Its capacity is 1,200 lbs. Besides the body shown in the illustration the truck is furnished with any special style of body, and by the substitution of such body may be adapted to the transportation of cement, sand, gravel or other material used in road work. It is manufactured by the Tiffin Wagon Co., Tiffin, Ohio.



NEW TIFFIN 1,200-LB. TRUCK.

PERSONAL NOTES

Claude Phillips has been elected Street Superintendent of Huntsville, Ala.

H. E. Ellsworth has been appointed Supervisor of State Roads for the district comprising Portland, Middletown, and Chatham, Conn.

George McBride, County Surveyor of Douglas County, Neb., and formerly Assistant City Engineer of South Omaha, Neb., died October 14, aged 55.

G. F. Porter, engineer of construction with the St. Lawrence Bridge Co., Montreal, P. Q., has been elected a member of the American Society of Civil Engineers.

G. Janin, Chief Engineer of Montreal, P. Q., has submitted a report to the Board of Controllers of Montreal on engineering problems and road construction in European cities which he has recently visited.

Louis M. Hastings, City Engineer, and E. W. Quinn, Superintendent of Streets, of Cambridge, Mass., have been appointed members of the newly created Sanitary Commission of that city.

NEWS OF THE TRADE

The Inland Steel Co., of Chicago, Ill., has opened a branch sales office in the Majestic Bldg., Milwaukee, Wis. C. M. Easterly, District Sales Manager, is in charge.

The business of the Lakeland Paving & Construction Co., Lakewood, Fla., composed of F. J. Hoffman, J. N. Davis and J. P. Newbecker, has been sold to G. H. Alfield and B. H. Belisario.

The Good Roads Construction Co., with offices at 518 Monadnock Block, Chicago, Ill., has recently been formed for contracting in paving work. A. S. Lewis, formerly Superintendent of Lincoln Park, Chicago, is the general manager of the company.

The Sullivan Machinery Co. of Chicago, Ill., announces that Myron G. Doll, for several years local manager of the company at Salt Lake City, has resigned, and that H. E. Moon, heretofore associated with the Denver, Colo., office of the company, has succeeded Mr. Doll.

The Troy Wagon Works Co., of Troy, Ohio, announces that the new line of trailers designed especially for use behind motor trucks on which it has been working for the past two years is now ready to be placed on the market. The company has issued a 12-page illustrated circular describing the new trailer in detail.

The Dunn Wire-Cut-Lug Brick Co., of Conneaut, O., has closed a contract with the Southern Clay Manufacturing Co., of Chattanooga, Tenn., of which W. M. Lasley is president. Machinery for manufacturing Dunn Wire-Cut-Lug brick will be installed at an early date. The Southern Clay Manufacturing Co. has three brick making plants located at Robbins, Tenn., Coaldale, Ala., and Chilhowie, Va., respectively.

Thomas M. Roche, formerly Manager of the Road Department of the American Asphaltum & Rubber Co., Chicago, Ill., has severed his connection with that company and is engaged in the selling of road material and machinery with headquarters at 518 Monadnock Bldg., Chicago, Ill.

The Connecticut Good Roads & Construction Co. has been incorporated with a capital stock of $50,000. The headquarters of the new company will be at New Britain. The incorporators are Peter Suzio, of New Britain; Leo. B. Santangelo, of Middletown, and Frank Broggi, of Meriden.

The Holt Manufacturing Co. of Stockton, Cal., and Peoria, Ill., has received notice from the directors of the traction engine contest recently conducted by the Argentine government, that the first prize of $15,000 was awarded to the Holt "caterpillar," 60 H.P. gas tractor. There were twelve tractors entered by American and foreign manufacturers.

E. A. Kingsley, of Little Rock, Ark., and R. C. Huston, of Memphis, Tenn., have organized the Huston-Kingsley Co., Incorporated Engineers, with offices in the Southern Trust Bldg., Little Rock, Ark., and Exchange Bldg., Memphis, Tenn. The firm will take over the engineering contracts of R. C. Huston & Co., and of E. A. Kingsley. The business will be under the management of R. C. Huston, president of the company.

The Watson Wagon Co., of Canastota, N. Y., has issued a new 4-page folder describing the use of Watson dump wagons as trailers behind motor trucks. Attention is called particularly to the Watson 3-yd. dumping wagon, the Watson Standard 5-yd. wagon and the Watson Special 120-cu. ft. asphalt trailer. The folder is printed in two colors, black and yellow, and measures 9x12 ins. It contains several illustrations showing the various styles of Watson wagons in use as trailers.

The Universal Portland Cement Co. of Chicago, Ill., is distributing a 72-page booklet entitled "Small Concrete Bridges and Culverts." The text is devoted to information regarding the construction of small bridges and culverts of concrete, specifications, tables, etc. A large number of illustrations showing cross sections and elevations are included, and also a number of halftones showing the work of construction and completed bridges and culverts. The booklet measures 6 by 9 ins.

The Dolarway Paving Co. of New York, N. Y., has just completed the compilation of a new booklet devoted to a general description of Dolarway pavement. A number of testimonials from city officials and others familiar with Dolarway pavement are included. The booklet contains 32 pages and cover, measuring 6 by 9 ins. It is printed in two colors, yellow and black, and contains a large number of half-tone illustrations showing examples of Dolarway pavement in various parts of the country.

The Amies Road Co. of Easton, Pa., is distributing a new booklet devoted to an analysis of Amiesite paving material, and including a description of Amiesite road construction in various parts of the country, with half-tone illustrations showing the work. A list of the licensees operating permanent manufacturing plants under the Amies patents is included. A statement of the output of the company, from the time it was chartered, Jan. 5, 1909, to the end of 1912, shows that 330,551 tons of Amiesite were sold, and 2,235,974 sq. yds. of Amiesite pavement were laid. The booklet measures 7½ by 8¼ ins., and contains 32 pages and cover. The inside is printed in two colors throughout, red and black. The cover is printed in blue and red, the word Amiesite being embossed in red across the front cover.

GOOD ROADS

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Notice to discontinue subscription should be sent to the New York office.

Copy for advertisements of which proofs are to be submitted to advertisers should reach the New York office as follows: For insertion in the first issue of the month, by the fifteenth of the preceding month; for other issues, by noon on Thursday of the week before date of issue.

Copy for all advertisements of which proofs need not be submitted—including "Proposal," "For Sale," "Want" and other classified advertisements—will be accepted until noon on Thursday of the week of issue.

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Contracts for Street Improvement in Dallas, Texas

The City Commissioners of Dallas, Tex., have awarded contracts for improving seven streets of the city, involving a total expenditure of about $250,000. This includes the portions paid by the city, the property owners and the railway companies.

Three of the streets will be paved with wood blocks on a concrete foundation, two with bitulithic on a concrete foundation, and two will be constructed of bituminous concrete.

The contracts for improving five of the streets have been awarded to the Texas Bitulithic Co. of Dallas, at an aggregate bid of over $200,000. The contracts for improving the other two streets were awarded to the Roach-Manigan Co. of Dallas, at about $50,000.

Besides paving, the work of improvement includes the construction of curbs, gutters, and storm sewers. The three streets to be paved with wood blocks are 10th St., between Bishop and Willomet; Young St., between Harwood and Akard, and Wood St., between Harwood and Ervay. Tenth St. will be paved with 3½-in. blocks on a 5-in. concrete base, and Young and Wood Sts., with 3½-in. blocks on a 6-in. concrete base. The price per square yard for the 10th St. job was $3.10, and that for the work on Young and Wood Sts. was $3.18. Peak St., between Elm and Ross, and San Jacinto, between Germania and Washington, will be paved with bitulithic on a 5-in. concrete foundation. Thomas Ave., between Haskell and Carroll, and Carroll, between Thomas and Munger will be paved with bituminous concrete, built with Bermudez asphalt. The price for the bituminous concrete is $1.92 per sq. yd.

The Texas Bitulithic Co. secured the contracts for the improvement of 10th, Young, Wood, Peak, and San Jacinto Sts., and the work of improving the other two will be done by the Roach-Manigan Co.

In addition to the above work, Garrett St. will be improved immediately. Bids were received at the same time as the others for the improvement of a portion of Garrett St., but because of the fact that property owners have since petitioned for the paving of the street its entire length, the work will be readvertised.

New York City Bureau of Highways in New Quarters

The Bureau of Highways of New York City has moved from the temporary quarters which it has occupied for several years at 21 Park Row, to its permanent offices in the new Municipal Building. The bureau occupies the entire front of the twenty-first floor, a considerable portion of the rear of that floor, and a part of the twentieth floor.

The new offices are roomy and comfortable, and are provided with every modern accessory for carrying on the work of the bureau. All of the offices of the suite, with the exception of the storerooms, are outside rooms, amply lighted and ventilated. All, except the large room occupied by the field force, which is on the east side of the building, face on City Hall Square. The storerooms, of which there are several at convenient intervals, are large and fully adequate for the filing of records, blueprints, maps, etc.

The accounting division of the Department of Public Works is located on the twentieth floor. In common with all the city departments which will eventually occupy the building, the Department of Public Works is provided with a separate telephone exchange.

Plan Intercounty Highway in Georgia

A movement has been started in Southern Georgia for the construction of a graded highway connecting the county seats of six of the counties in that section.

According to present plans, the highway will begin at Albany, Dougherty County, and will run east to Sylvester, Tifton, Ocilla, Douglas, and Waycross, the county seats of Worth, Tift, Irwin, Coffee, and Ware Counties, respectively. At Albany it will connect with the Atlanta-to-the-Gulf Highway, and at Tifton with the "national highway" between New York City and Jacksonville, Fla. An extension is contemplated from Waycross to connect with the proposed Savannah to Jacksonville Highway, giving a direct route to Savannah from the important points in that section of the State.

The main purpose of the movement is to promote closer business relations between the cities and towns along the route. It will be the first graded highway east and west through the section.

The county authorities of the various counties are said to be interested in the proposition, and are planning to build their several sections of the proposed highway. The new State road supervisors, who will be appointed at the first of the year, will be asked to take charge of construction work.

Proposed Concrete Roads in Essex County, Ontario

The County Council of Essex County, Ontario, has decided to submit a by-law on January 1 providing for the expenditure of $1,000,000 for the construction of concrete roads.

The county is principally an agricultural community and it is understood that the farmers are in favor of the measure. Windsor, the county seat, is directly across the river from Detroit, and has a few concrete paved streets, but it is claimed that the observation of the concrete highways in Wayne County has been the principal factor in determining the selection of this type of pavement for the proposed Essex County work.

Proposed Street Improvement in Baltimore, Maryland

The Paving Commission of Baltimore, Md., is engaged in making estimates for paving Baltimore St. between Broadway and Paca St. and Howard St. between Baltimore St. and Richmond Market. It has been practically decided to pave these streets with sheet asphalt, with the exception of the space between the car tracks, the material for which is still in question.

It is probable that in Baltimore St. the asphalt surface will be laid on an 8-in. concrete base. Baltimore St. is the most important business thoroughfare in the city and development along Howard St. has been very rapid during the past year. It is the plan of the Paving Commission to make the two streets the "show" streets of the city.

Work Commenced on the Boulevard System in St. Joseph, Missouri

Bids for the grading of Boulevard A, the first section of the new system of boulevards planned for St. Joseph, Mo., were opened Oct. 30 by the Park Board of that city.

Following the grading, the boulevard will be paved and oiled and parkway strips along either side will be improved. Boulevard A extends from the junction of 30th and Patee Sts. to 31st St. and Mitchell Ave., where it enters Bartlett Park. It will be connected by a parkway with Noyes Blvd., which will extend from 28th and Osage Sts. to 28th and Messanie Sts. The entire driveway between 28th and Osage Sts. and Bartlett Park will be called Noyes Blvd., the southern section having been designated as Boulevard A because it was established under a separate legal proceeding. It is planned to commence the work of improving the main section of Noyes Blvd. next spring.

Extension of Seventh Avenue, New York City

Property owners and residents along the line of the contemplated extension of Seventh Ave., between Greenwich Ave. and Varick St., New York City, are preparing for the demolition of the buildings within the area which has been condemned. This includes eleven blocks between Greenwich Ave. and Varick St., and the entire easterly side of Varick St., south from Greenwich Ave., to West Broadway, a distance of 15 blocks, which will be set back 35 ft. from the present building line. In all, over 250 structures will be torn down to make room for a 100-ft. thoroughfare, which will extend as a straight avenue from the commercial district about Franklin St. to the present southern terminus of Seventh Ave.

A number of old residences, flat buildings and business structures including some of the old landmarks of the city in Greenwich Village will be removed. Among these will be the Bedford Street Methodist Church on the corner of Morton St., which has occupied that site for over 70 years, and was built to succeed an earlier church erected in 1810.

Several blocks of the buildings to be torn down belong to the Trinity Church Corporation. Altogether, 44 of these buildings will be razed. In the middle of one of the blocks is St. John's Chapel, one of the oldest churches in the city. The amount of land demanded by the city will include all the vacant space between the present street and the church entrance, and a part of the entrance itself.

The city has taken title to all necessary land, but it is expected that it will be some time before the awards for the property are made. Hearings on the values are now being conducted before the commissioners appointed to condemn the land. The city charter provides for the right to demolish buildings for a public improvement before the valuation has been determined by a commission.

The work of examining the structures to be removed, which required several weeks, has been practically completed, and the Department of Public Works will shortly order the work of destruction to begin. It is expected that the work of removing buildings will commence in the lower blocks of Varick St., between West Broadway and Canal St.

A Bond Issue of $125,000 for highway improvements will be voted upon in Jim Wells County, Texas, on Oct. 25.

Damages to Bridges in Bexar County, Texas, as a result of the recent floods are estimated to amount to about $100,000. Bell County also suffered serious losses at the same time.

The Commissioners' Court of Val Verde County, Texas, has called an election for November 25, at which time the proposition of issuing $175,000 in road bonds will be submitted to the voters.

Work on the Construction of the Southern Boulevard, between Oregon Ave. and League Island, Philadelphia, Pa., 300 ft. wide, was started recently by the Hassam Paving Co. of Worcester, Mass., which was awarded the contract at a bid of about $185,000.

Arrangements Have Been Completed for the improvement of the San Antonio-Austin Highway in Texas, by the citizens of the two cities and of the intervening territory. A date early in December will be set, when all citizens will be asked to work on the road.

A Road through Turnbull Canyon, in Los Angeles County, Cal., will be built, according to a recent decision of the Board of County Supervisors. It is estimated that the construction of this road between Whittier and Puente will shorten the distance between Whittier and the Valley Boulevard by 12 miles. Work will commence as soon as the right of way can be secured.

City Commissioner Dieck, of Portland, Ore., has appointed a committee composed of Superintendent Dulin, of the City Bureau of Standards, and Chief Homes, of the Bureau of Highways, to investigate matters pertaining to a proposed municipal paving plant. The cost and availability of the plant as well as the selection of a site are to be considered. Tentative plans for the plant have already been prepared.

The North Shore Road, at Lake Minnetonka, Hennepin County, Minn., will be the first to be improved in that county under the provisions of the new law governing highway work in Minnesota. The contract for this road, which extends a distance of three miles between the west line of the Village of Wayzata and the east line of Minnetonka Beach, was awarded on Sept. 10 for $46,500. The road will be paved with concrete.

Bond Elections Involving a Total of $850,000 were held in Texas during September of this year, according to a report of the Texas Commercial Secretaries and Business Mens' Association. Nine elections were held, the necessary two-thirds majority being secured in favor of the bond issues in seven. The counties in which bond elections carried, together with the amounts in each, follow: Calhoun, $5,000; Trion, $20,000; Galveston, $250,000; Maverick, $25,000; Nueces, $165,000; Trinity, $100,000; Waller, $15,000; total, $580,000. A $250,000 issue was defeated in Montgomery County, and one for $25,000 failed to secure a favorable majority in Matagorda County.

Highway Work in Alabama

According to a report of State Highway Engineer W. S. Keller, of Alabama, for the three months ending September 30, contradts for highway work under the diredtion of the State Highway Department were awarded in four counties as follows: Cleburne, $8,000; Winston, $8,000; Macon, $4,000; Shelby, $4,000.

Work was started in Etowah, Dale, Dallas, Blount, Butler, Clay, Greene, Lowndes, Macon and Shelby counties, and work was completed in Lee, Franklin, Coosa, Cullman, Pike, Shelby, Sumter and St. Clair counties. Surveys for road work are now in progress in DeKalb and Autauga counties.

Highway Bond Issue Probably Defeated in Pennsylvania

While complete returns have not yet been received, it is evident from figures available as we go to press, that the constitutional amendment authorizing the issue of $50,000,000 in bonds for highway improvement in Pennsylvania which was voted upon at the election on Tuesday of this week was lost.

Early returns indicated that the vote in the rural districts was strongly against the amendment, but it was thought that it would receive a majority large enough to save it in the cities. When the final counts in the so-called suburban counties were made, however, it was found that with the single exception of Philadelphia, these counties had returned majorities against the amendment. Philadelphia county's vote was 72,834 in favor of the amendment and 15,490 against it. The majority against the issue in Allegheny county was but a few hundred, but that in Berks, Lancaster and Dauphin were decisive.

Altogether the amendment probably carried in about seven counties.

The State Grange has actually opposed the amendment and to this fact is credited, in a large measure, its defeat.

Proposed County Road System in Cayuga County, New York

The question of establishing a county system of roads will be one of the first to be considered by the Board of Supervisors of Cayuga County, New York, when it convenes for the fall term, Nov. 10.

In order that Cayuga County may issue bonds for road work it is necessary that special legislation be enacted, and one of the initial steps will be securing the co-operation of the local members of the Assembly and State Senate.

It is proposed to construct water bound macadam throughout the entire system of roads in the county, about 100 miles in extent. These roads were petitioned for at the last session of the Board of Supervisors, but the petitions were refused by the State Highway Department because they called for expenditures exceeding the county's apportionment for state roads.

According to present plans, the construction work will be done under the supervision of the town highway superintendents rather than by contract. Preliminary grading will be done by towns, the cost being paid from the state aid fund allotted to the county. Machinery belonging to the towns will be used, and crushed stone will be furnished by the county.

Proposed Expenditure for Street Improvement in San Antonio, Texas

Mayor Brown of San Antonio, Texas, is formulating plans for the expenditure of the proceeds of the $1,500,000 bond issue recently authorized for street improvements. This will be divided among the eight wards of the city, consideration being given in making the apportionment to the population, assessed valuation, and the street mileage in each of the several wards. The question of which streets are to be improved will be left largely to the people of the several wards.

As announced in a previous issue of "Good Roads" it is the policy of the city administration to pave the business section of the city and the main traveled thoroughfares first, extending the work to the cross streets and residential districts later.

A map of the city, showing the downtown streets and the main arteries through the wards and indicating those which will probably be paved has been prepared by City Engineer Helland. This map will be sent to Samuel M. Gray, a New York engineer, who was recently employed to plan and supervise sewer extensions and the improvement of the drainage system. Those streets which are to be improved will receive special attention in the matter of drainage and sewers, and it is planned that the underground work will be completed before any streets are paved. A majority of the sewers in the streets to be improved are already in place, but an investigation will be made before the work of surfacing begins, with a view to determining if the existing sewers are adequate.

Petitions Are Being Circulated throughout the territory between Del Rio and Brownsville, Tex., asking for the construction of a federal military highway along the Rio Grande River between the two points. The petitions will be presented to the War Department.

The Cost of Maintenance of Roads in East Suffolk, England, amounted to nearly £141 per mile last year, according to the report of County Surveyor W. Jervis. The total cost of the direct maintenance of 308 miles of main roads in urban and rural districts amounted to £43,390.

The Construction of the Section of the South Windsor and Boston road, extending from South Windsor to Scitico, in the town of East Hartford, Conn., has been completed and accepted by the town authorities. The road is of Warrenite construction, and the work was done by Warren Bros. Co., of Boston, Mass. It was commenced May 30 of this year.

Asphalt Paving on Over Three Miles of Streets in Tuscaloosa, Ala., has either been completed or authorized during the past eight months at a cost of approximately $200,000. The total expenditure for street improvements during the past year, including curbs, gutters, concrete sidewalks and storm and sanitary sewers, amounts to about $350,000.

Putting Up Markers on a Stretch of Highway 800 miles long was accomplished in one day, Sept. 29, along the Borderland automobile route between Hutchison, Kan., and El Paso, Tex., by way of Lubbock. The work was done under the direction of the Trans-continental Touring Club. Sixty automobile organizations in towns along the highway participated.

The Thoroughfare Known as San Pablo Ave., which traverses Contra Costa and Alameda Counties, Cal., is to be paved at once between San Pablo and Stege Junction, in the latter county. The City of Richmond will do the work on that section lying within its boundaries and the county the remainder. The avenue is the most important highway in the two counties.

The City Commission of Kansas City, Kan., has approved estimates for grading the proposed Riverside Boulevard along the Argentine Heights, connecting with the Shawnee Road at Mill St. This is a preliminary step toward the construction of the boulevard which will begin at Twelfth St. and Ruby Ave. in the Argentine district, and follow the contour of the bluffs along the Kaw River to the Shawnee Road opposite the Fifth St. Bridge.

The Street Committee of the Board of Aldermen of Buffalo, N. Y., has taken favorable action on the proposition to pave Kenilworth Ave., the connecting link between Main St. and the new Niagara Falls Boulevard, which was completed to the Buffalo city lines some time ago. Kenilworth Ave., which is the logical connecting link between the new boulevard and Main St., is at present in need of improvement. It is considered doubtful that the work will be accomplished this year.

MEETINGS

A meeting was held Oct. 21 at Tupelo, Miss., for the purpose of forming a permanent organization, the object of which will be the construction of a public highway between Memphis, Tenn., and Birmingham, Ala., through the western part of Tennessee and the northern part of Mississippi and Alabama. The meeting was attended by delegates from Marshall, Benton, Union, Pontotoc, Lee, and Ittawamba Counties, Miss. Resolutions were adopted favoring the establishment of the highway and endorsing the proposition to organize permanently, and to appoint an executive committee for the purpose of devising ways and means for the building of the road.

The Midland Automobile Association was organized at a recent meeting held at Midland, Texas. One of the main purposes of the organization is to promote the proper maintenance of the automobile roads in the Midland district, and 50 automobile owners have signed agreements to maintain the roads for a period of one year. Most of the motor car traffic of that district is over special roads, across large privately owned lands, and, although used by the public, these roads are in reality private roads, and are so maintained. The new association will undertake a uniform distribution of the maintenance and improvement of these roads. M. F. Burns was made Manager and Treasurer of the Association, and Judge E. R. Bryan, Dr. J. B. Thomas, and George D. Elliott were appointed an advisory committee.

At a good roads meeting held at Guthrie Center, Ia., Oct. 23, the establishment of a new highway between Jefferson and Council Bluffs was planned. The route of the proposed road follows the line of the Spirit Lake Highway between Jefferson and Panora, and the Panora Speedway between Panora and Guthrie Center. From Guthrie Center the proposed road will follow the River to River Road to Council Bluffs. The proposed route is said to be eight miles shorter than the Transcontinental Road. W. G. Roberts of Panora was elected President of the association, which will promote the project, and L. M. Swindler of Yale was made Secretary and Treasurer. A cash prize has been offered to the person who submits the most suitable name for the proposed highway. Another meeting will be held in the near future, when definite plans for the improvement of the highway will be made.

COMING MEETINGS

November 10-15.—United States Good Roads Association.—Convention, St. Louis, Mo. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

Nov. 20-22.—Alabama Good Roads Association.—Seventeenth annual convention, Mobile, Ala. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

December 9-12.—American Road Builders' Association.—10th Annual Convention, 4th American Good Roads Congress and 5th Annual Exhibition of Machinery and Materials, First Regiment Armory Bldg., Philadelphia, Pa. Secretary, E. L. Powers, 150 Nassau St., New York, N. Y.

February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

United States Good Roads Associations

The convention of the United States Good Roads Association will be held at St. Louis, Mo., during the six days beginning next Monday, November 10.

As noted in this column in the issue of Oct. 18, the six days of the convention are to be designated as "Governors' Day," "Mayors' Day," "Legislative Day," "Farmers' Day," "State Officers' Day" and "Press and Education Day," respectively. In addition to the addresses previously announced, the program will include the following papers:

"The Granger a Road Builder," by Dr. H. J. Waters, President, Kansas Agricultural College; "Road Building an Investment," by Thomas T. Fauntleroy, Missouri Director, United States Good Roads Association; "Get Together and See the Mud Disappear," by Jesse Taylor, President Ohio Good Roads Federation; "Our Grange and Good Roads," by Dr. J. W. Muir, La Grange, Mo.; "Progress of Road Building in the South," by John Craft, President Alabama Good Roads Association; "The Roads the Government Should Build," by Rev. S. M. Johnston, Roswell, N. M.; "The Farmer and Improved Highways," by James P. Phillips, Ewing, Mo.; "Report on the International Road Congress held in London, England," by G. A. Nelson, New Decatur, Ala.; "Why We Will Build Better Roads," by P. H. Cullen, St. Louis, Mo.; "The Organization of the United States Good Roads Association," by J. A. Rountree, Secretary United States Good Roads Association; "Better Roads and Better Crops," by P. P. Lewis, President Missouri State Board of Agriculture; "National Roads vs. National Aid," by Judge J. M. Lowe, President National Old Trails Road Association.

The County Engineers of Washington will hold their Annual Convention at North Yakima, Nov. 18 and 19.

PERSONAL NOTES

William Hodder has been appointed Street Commissioner of McKeesport, Pa.

R. A. Bonnell has been appointed City Engineer of Lewiston, Idaho, succeeding D. C. Wrighter, who recently resigned.

Jonathan Jones, Assoc. M. Am. Soc. C. E., has been appointed Assistant Engineer in the Bridge Division of the Bureau of Surveys of Philadelphia, Pa., succeeding H. H. Quimby, who was recently appointed Chief Engineer of the Department of City Transit.

Alba B. Johnson, Charles O. Kruger, John Gribbel, John R. Grundy, Julius E. Nachod, George Sullivan, Penrose Robinson, Arthur P. Townsend, Marshall R. Pugh, Emile J. Berlet, Samuel F. Houston, A. Merritt Taylor, Randal Morgan, and William S. Ellis have been appointed members of the Suburban Metropolitan Planning Commission, by Gov. Tener of Pennsylvania. This commission has been established to make plans for systems of transportation, highways, parks, parkways, and other civic improvements in the territory adjacent to Philadelphia.

The City Commissioners of Atlantic City, N. J., are having plans prepared for the widening of the Boardwalk from 40 ft. to 60 ft. between Maryland and Rhode Island Aves., and from 20 ft. to 40 ft. between Rhode Island and New Hampshire Aves.

The Town Board of Southampton, L. I., has under consideration a proposition to change the route of the main highway through the village of Good Ground so as to avoid dangerous crossings and reduce the abruptness of curves. It is desired that the new highway be laid out south of the railroad at Good Ground, passing underneath the tracks of Tiana Bay crossing.

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Report of the New York Board of Consulting Engineers

The Board of Consulting Engineeers, consisting of George C. Diehl, Harold Parker and William DeH. Washington, appointed by Commissioner of Highways John N. Carlisle of New York, shortly after he assumed office last spring, has recently made a report in which various changes in the organization and operation of the department are recommended.

The report begins with a review of the history of road building in New York state. This is followed by an outline of the proposed reorganization of the highway department. The plan proposed provides for a department headed by a commissioner controlling the work through a chief engineer, a secretary and an auditor—the first to have charge of all construction and maintenance work, the second of all records and the third of all fiscal affairs. By the plan the state is divided into nine divisions, each in charge of a division engineer. These nine divisions are grouped in two districts, each in charge of a deputy engineer, acting under the order of the chief engineer. The headquarters of the deputy engineers, the chief engineer, the secretary, the auditor and the commissioner would be at Albany, while the division engineers would have their headquarters in the divisions to which they were assigned. Each division engineer would have charge of all the construction and maintenance of state, county and town highways within his division and would have under him approximately seven assistant engineers in direct charge of this work. He would also have three maintenance gangs which he would assign to the different sections as they were needed. The chief engineer would have as assistants three resident engineers and a secretary. Each deputy engineer would have as an assistant a resident engineer, as would also each division engineer. The report of the board states specifically the duties of these officers and employes.

Another matter taken up in considerable detail in the report of the board is the order of procedure for the construction of county highways. This is explained step by step, from the making of preliminary resolutions by the county supervisors to the final payment of the contractor.

The report also discusses the subjects of traffic census and statistics, specifications, the determination of the types of pavements, state and county highways, town highways, bridges, maintenance and road signs. It contains, in addition, a chapter in which are outlined the various reports to be made by the several officials. There is also a table showing the geological distribution of road material throughout the state. The report contains two inset diagrams, one showing the proposed organization of the department and the other showing graphically the successive steps in the improvement of a county highway.

In conclusion the board makes recommendation that:

(a) The highway law be amended to provide for the organization as herein described.

(b) A board be created to consider and report upon appropriate state and county road systems, and methods of financing them.

(c) Statistics be compiled, including traffic census and cost data, and continued tests be made to determine the most effective and economical forms of construction under the widely varying conditions.

(d) Complete records of all employees kept in order that the most efficient organiaztion can be soonest perfected.

(e) All state and county highways be signposted.

(f) Dangerous curves on state and county highways be widened and suitably banked.

(g) Old road surfaces be utilized for foundations, as far as practicable.

(h) The greatest care be exercised in the selection of materials and by thorough workmanship to secure good construction.

(i) Construction, maintenance and town highway work be consolidated.

(j) The engineering or construction department be made permanent and kept free from politics, and be required to pass upon technical matters only.

(k) The commissioner through consulting engineers be kept fully in touch with construction work and be informed of the most advanced methods in use in other states and countries.

(l) The commissioner prescribe regulations limiting the size, width and weight of vehicles, and governing the width and character of tires.

(m) Immediate reports be made on the condition of all completed state and county highways and estimates made of the cost of the reconstruction, repair and maintenance of each.

Appropriations for Sidewalk Construction in the several villages in the town of Islip, N. Y., were authorized at the recent election. By the vote the town board is authorized to appropriate funds as follows: West Islip, $2,000; Brentwood, $2,000; West Sayville, $2,000; Central Islip, $3,000; Sayville, $4,000, and Bayport, $4,000.

The City Council Committee on Roads and Bridges of Minneapolis, Minn., has taken initial steps towards the improvement of Central Ave., and Division St. The former is to be straightened and the latter widened under the Elwell law in order to provide a short route between Minneapolis and St. Paul. The improvement will cost approximately $226,000.

Program of the Philadelphia Convention

Practically all of the assignments of papers and discussions for the sessions of the coming convention of the American Road Builders' Association have been made. A tentative program of the convention, which will be held at the First Regiment Armory, Broad and Callowhill Streets, Philadelphia, Pa., December 9 to 12, inclusive, has been prepared by the convention committee and it is probable that very few changes will be made in the weeks remaining before the holding of the meeting. The tentative program follows:

FIRST SESSION.

TUESDAY, DECEMBER 9, 10 A. M. TO 12 M.

Addresses of welcome. Response by Samuel Hill, President of the American Road Builders' Association.

SECOND SESSION.

TUESDAY, DECEMBER 9, 2 P. M.

Subject A.—Organization.

1. "Highway Officials, Their Duties and Powers."

Paper: Col. E. A. Stevens, Commissioner, Department of public Roads of New Jersey.

Discussion: C. J. Bennett, State Highway Commissioner of Connecticut; F. W. Buffum, State Highway Commissioner of Missouri; A. N. Johnson, State Highway Engineer of Illinois; T. H. MacDonald, Highway Engineer, Iowa State Highway Commission; A. R. Hirst, State Highway Engineer of Wisconsin; Sidney Suggs, State Highway Commissioner of Oklahoma.

2. "Division of Expense, Responsibility and Authority Between Nation, State, County and Town."

Paper: S. Percy Hooker, State Superintendent of Highways of New Hampshire.

Discussion: Nelson P. Lewis, M. Am. Soc. C. E., Chief Engineer, Board of Estimate and Apportionment, New York, N. Y.; Harold Parker, M. Am. Soc. C. E., ex-Chairman Massachusetts Highway Commission; J. de Pulligny, Director of the French Mission of Engineers to the United States.

THIRD SESSION.

WEDNESDAY, DECEMBER 10, 10 A. M.

3. "The Relation to Each Other of the Contractor, Engineer and Inspector."

Paper: F. L. Cranford, Road Contractor, Brooklyn, N. Y.

Discussion: Major W. W. Crosby, M. Am. Soc. C. E., Chief Engineer Maryland Geological and Economic Survey and Consulting Engineer; H. W. Durham, M. Am. Soc. C. E., Chief Engineer Bureau of Highways, Borough of Manhattan, New York, N. Y.; Fred E. Ellis, Manager Essex Trap Rock & Construction Co., Peabody, Mass.

4. "Details of Arrangements for Use of Convict Labor."

Paper: Joseph Hyde Pratt, Ph. D., State Geologist of North Carolina.

Discussion: P. St. J. Wilson, State Highway Commissioner of Virginia; C. M. Kerr, Assistant Engineer, State Highway Department, Louisiana; Joseph P. Byers, Commissioner of Charities and Correction of New Jersey.

FOURTH SESSION.

WEDNESDAY, DECEMBER 10, 2 P. M.

Subject B.—Construction.

1. "Determination of the Amount of Realignment, Grading and Drainage to Be Done in Connection with Road Improvement."

Paper: S. D. Foster, M. Am. Soc. C. E., Chief Engineer State Highway Department of Pennsylvania.

Discussion: R. A. Meeker, State Highway Engineer, Department of Public Roads of New Jersey; J. H. MacDonald, ex-State Highway Commissioner of Connecticut; H. L. Bowlby, State Highway Engineer of Oregon; J. A. Johnston, Division Engineer, Massachusetts Highway Commission.

2. "Factors Governing a Proper Selection of Road or Street Pavement."

Paper: L. R. Grabill, Superintendent of Suburban Roads, Washington, D. C.

Discussion: Wm. D. Sohier, Chairman, Massachusetts Highway Commission; G. W. Tillson, M. Am. Soc. C. E., Consulting Engineer, Borough of Brooklyn, New York, N. Y.; W. A. McLean, M. Can. Soc. C. E., Chief Engineer of Highways and Commissioner of Ontario Public Roads and Highways Commission, Toronto, Ont., Canada; R. B. Gage, Chemist, Department of Public Roads, New Jersey; D. B. Goodsell, Assistant Engineer, Bureau of Highways, Borough of Manhattan, New York, N. Y.

FIFTH SESSION.

THURSDAY, DECEMBER 11, 10 A. M.

3. Ten-Minute Papers on the Details of the Construction of Various Kinds of Roads and Pavements.

"Bituminous Macadam and Bituminous Concrete."

Paper: Linn White, Chief Engineer, South Park Commissioners, Chicago, Ill.

Discussion: Arthur H. Blanchard, M. Am. Soc. C. E., Professor of Highway Engineering, Columbia University; F. C. Pillsbury, Division Engineer, Massachusetts Highway Commission.

"Earth Roads."

Paper: E. A. Kingsley, State Highway Engineer of Arkansas.

"Sand-Clay Roads."

Paper: E. J. Watson, Commissioner, Department of Agriculture, Commerce and Industries, South Carolina.

"Gravel Roads."

Paper: G. W. Cooley, State Engineer, Minnesota State Highway Commission.

"Concrete Roads."'

Paper: F. F. Rogers, C. E., State Highway Commissioner of Michigan.

"Brick Roads."

Paper: J. M. McCleary, Road Engineer, Cuyahoga County, Ohio.

"Wood and Asphalt Block."

Paper: H. H. Schmidt, Chief Engineer, Bureau of Highways, Borough of Brooklyn, New York, N. Y.

"Water Bound Macadam."

Paper: J. W. Hunter, Deputy State Highway Commissioner of Pennsylvania.

"Sheet Asphalt."

Paper: John B. Hittell, Engineer, Board of Local Improvements, Chicago, Ill.

"Granite Block."

Paper: R. H. Gillespie, Engineer of Highways, Borough of The Bronx, New York, N. Y.

4. "Unit Price and Lump Sum Contracts and Percentage Work."

Paper: H. C. Hill, Engineer, Lane Construction Corporation, Meriden, Conn.

Discussion: J. J. Ryan, Secretary New York Road Builders' Association; C. A. Kenyon, President Indiana Good Roads Association; Joseph Walker, Contractor, Albany, N. Y.; J. T. Gephart, Jr., Assistant Engineer State Highway Department of Pennsylvania.

THURSDAY, DECEMBER 11, 2:30 P. M.

Automobile inspection trip covering recent road and pavement work in and around Philadelphia.

SIXTH SESSION.

THURSDAY, DECEMBER 11, 8 P. M.

Popular Program: Addresses by distinguished guests; illustrated talks on famous roads of the world. Program to be announced.

SEVENTH SESSION.

FRIDAY, DECEMBER 12, 10 A. M.

5. "The Testing of Materials for Road and Street Construction."

Paper: Prevost Hubbard, in charge Division of Roads and Pavements, The Institute of Industrial Research, Washington, D. C.

Discussion: F. P. Smith, Consulting Chemist and Paving Engineer, New York, N. Y.; J. E. Myers, Chief Chemist, New York State Commission of Highways; C. S. Reeve, Chemist, U. S. Office of Public Roads.

Subject C.—Maintenance.

1. "Sub-Organization for Securing Efficient Maintenance."

Paper: J. N. Carlisle, State Highway Commissioner of New York.

Discussion: A. B. Fletcher, Highway Engineer, California Highway Commission; J. S. Gillespie, Road Commissioner, Allegheny County, Pennsylvania; W. D. Uhler, Assistant Engineer, Department of Public Works, Philadelphia, Pa.

EIGHTH SESSION.

FRIDAY, DECEMBER 12, 2 P. M.

2. "General Methods of Repairs and Renewals."

Paper: A. W. Dean, M. Am. Soc. C. E., Chief Engineer, Massachusetts Highway Commission.

Discussion: Paul D. Sargent, M. Am. Soc. C. E., Chief Engineer, State Highway Commission of Maine; A. D. Williams, Chief Road Engineer of West Virginia; Robert C. Terrell, State Commissioner of Public Roads of Kentucky; H. G. Shirley, Chief Engineer, Maryland State Roads Commission; R. J. Potts, Professor of Highway Engineering, Agricultural and Mechanical College of Texas; B. Michaud, Deputy Minister of Roads, Quebec, Canada.

3. "Bituminous Surface Treatment and Dust Prevention."

Paper: Wm. H. Connell, M. Am. Soc. C. E., Chief, Bureau of Highways and Street Cleaning, Philadelphia, Pa.

Discussion: C. W. Ross, Street Commissioner of Newton, Mass.; J. S. Sturdevant, Division Engineer, New York State Commission of Highways; W. L. Hempelmann, Engineer of Bituminous Roadways, Street Department, St. Louis, Mo.

Lectures on Highway Engineering at Columbia University

The names of the non-resident lecturers in the graduate course in highway engineering at Columbia University for the 1913-1914 session have recently been announced by Arthur H. Blanchard, Professor of Highway Engineering at Columbia. Although a part of the regular graduate course in highway engineering, these lectures are open to highway engineers and others interested. The dates of the lectures are to be announced later. The lecturers are as follows:

John A. Bensel, State Engineer of New York; William H. Connell, Chief, Bureau of Highways and Street Cleaning, Philadelphia, Pa.; C. A. Crane, Secretary, General Contractors' Association, New York, N. Y.; W. W. Crosby, Chief Engineer, Maryland Geological and Economic Survey, and Consulting Engineer, Baltimore, Md.; Charles Henry Davis, President, National Highways Association; John H. Delaney, Commissioner, New York State Department of Efficiency and Economy; A. W. Dow, Chemical and Consulting Paving Engineer, New York, N. Y.; H. W. Durham, Chief Engineer of Highways, Borough of Manhattan, New York, N. Y.; C. N. Forrest, Chief Chemist, New York Testing Laboratory; Walter H. Fulweiler, Chief Chemist, United Gas Improvement Co., Philadelphia, Pa.; Frank B. Gilbreth, Consulting Engineer, New York, N. Y.; George P. Hemstreet, Superintendent, The Hastings Pavement Co., New York, N. Y.; Samuel Hill, President, American Road Builders' Association; D. L. Hough, President, United Engineering and Contracting Co., New York, N. Y.; J. W. Howard, Consulting Engineer, New York, N. Y.; Arthur N. Johnson, State Highway Engineer of Illinois; William H. Kershaw, Manager, Paving and Roads Division, The Texas Co., New York, N. Y.; Nelson P. Lewis, Chief Engineer, Board of Estimate and Apportionment, New York, N. Y.; Harold Parker, First Vice President, Hassam Paving Co., Worcester, Mass.; Paul D. Sargent, Chief Engineer, Maine State Highway Commission; Philip P. Sharples, Chief Chemist, Barrett Mfg. Co., New York, N. Y.; Francis P. Smith, Chemical and Consulting Paving Engineer; New York, N. Y.; Albert Sommer, Consulting Chemist; George W. Tillson, Consulting Engineer to the President of the Borough of Brooklyn, New York, N. Y.

Meeting of Ontario Public Roads and Highways Commission

The first meeting of the Ontario Public Roads and Highways Commission was held at Ottawa, Oct. 28. In opening the session C. A. Magrath, chairman of the commission, outlined the plan of the provincial government for the future, stating that it had been decided to undertake a broad and comprehensive plan for promoting highway improvement, especially in the older settled portions of the province.

One of the principal matters brought before the commission was the need of a modern highway between Prescott and Ottawa. Several men, representing districts along the line between the two points spoke in behalf of the road.

Street Extension in Los Angeles, California

Condemnation proceedings have been started in the Superior Court of Los Angeles, Cal., against property owners along the line of the proposed extension of Broadway from 10th St. to Pico St. The ordinance of intention for this act was passed by the City Council May 27 of this year.

This is the first step in plans for immediate street improvements, the cost of which is estimated at about $3,000,000. It is believed that all property in the vicinity of the proposed extension will be enhanced in value by the proposed improvement, and, in addition, the present congestion in the business district will be relieved.

Among the defendants in the several condemnation actions taken are a number of corporations.

Proposed Alley Improvement in Washington, D. C.

Melvin C. Hazen, Surveyor of the District of Columbia, has submitted to the District Commissioners a plan for the improvement of alleys, which, if carried out, will do much toward eliminating the slums of the city.

Mr. Hazen recommends the construction of two minor streets through each interior alley in every case where such a plan is found practicable. This will be done in such a way as to provide two fronts for the lots with a parkway between the minor streets opening on to the main thoroughfares of the city. Mr. Hazen considers this plan preferable to the construction of interior parks which has been considered, inasmuch as it will make the proposed parks accessible from two streets. The minor street plan would also add a revenue from taxes, whereas the interior park plan would impose a burden upon the city. Mr. Hazen points out that parks would be surrounded more or less by unsanitary back yards, and by houses inhabited by tenants whose method of living would result in objectionable environments for parks.

There is an existing fund of $100,872 which is the result of the accumulation of appropriations in 1893, 1904, 1907, and 1908, made largely with a view of converting inhabited alleys into minor streets. Several efforts have been made to carry out this plan, but legal objections have heretofore been found to prevent it. Mr. Hazen believes that this fund can be made available for his plan.

MEETINGS

Southern Appalachian Good Roads Association

The Fifth Annual Convention of the Southern Appalachian Good Roads Association was held at Asheville, S. C., Oct. 22 and 23. Among the speakers at the first session were Governor Locke Craig of North Carolina and W. W. Finley, President of the Southern Railway Company. Reports on the progress of road work in North Carolina, South Carolina, Virginia, Georgia, West Virginia, Tennessee, Alabama and Kentucky, the states represented in the association, were read by delegates from those states.

Among the other speakers were C. B. Scott, Assistant Engineer, Virginia State Highway Commission, who spoke on the prospects for road work in his state, C. D. Williams, Chief Road Engineer of West Virginia, who spoke in behalf of federal aid in highway improvement, and J. A. Smith, Chairman of the Highway Commission of Hall County, Ga.

Dr. Joseph Hyde Pratt, State Geologist of South Carolina, was reelected President and Treasurer, and H. B. Varner of Lexington, S. C., was reelected Secretary.

The next convention will be held in 1914 at Bristol, Tenn.

Ocean to Ocean Highway Association

The third annual meeting of the Ocean-to-Ocean Highway Association was held in the Directors' Room of the Chamber of Commerce of Los Angeles, Cal., Oct. 24 and 25.

The following officers were elected: President, Col. D. K. B. Sellers, Mayor of Albuquerque, N. M.; First Vice President, Fred T. Colter of Springerville, Ariz.; Second Vice President, J. Y. Aragon of Magdalena, N. M.; Third Vice President, C. O. Barker of Banning, Cal.; Secretary, John Becker, Jr., of Belen, N. M.; Treasurer, Frank McKee of Albuquerque, N. M. Executive and legislative committees were elected for each of the three states represented in the association, Arizona, New Mexico, and California.

The next convention will be held at Yuma, Ariz., and that of the year following in Springerville, Ariz.

The Montgomery County Automobile and Good Roads Association was organized Oct. 4 at Conroe, Texas. M. E. Griffith was elected President, S. A. McCall Vice President and H. M. Crighton Secretary.

A meeting of the Spartanburg, S. C., County Good Roads Association, was held at Spartanburg Oct. 31. The principal feature of the meeting was the discussion of a method of improving the National Highway to the mountains.

An organization known as the Texas Convict-Built Road Association was formed at Dallas, Tex., Oct. 29. The movement was the result of action taken by the Galveston Chamber of Commerce Sept. 10 of this year. About 100 delegates from all sections of Texas attended the meeting. The purpose of the organization is the working upon the public roads of the state of every convict who is worthy of trust to that extent. J. L. Garvin of Dallas was elected President.

A meeting, held at the rooms of the Board of Trade of Columbus, Ga., Oct. 30, in the interest of the proposed new road between Columbus and Warm Springs, was attended by interested business men, planters, and county officials from Meriwether, Harris and Muscogee Counties. The route of the proposed road is by way of Midland, Ellerslie, Waverly Hall, Oak Mountain and Shiloh, a total distance of 39 miles, 12 of which are in Muscogee County, 20 in Harris, 2 in Talbot, and 5 in Meriwether. An association was formed to promote the building of the road. Frank G. Lumpkin was elected President and Willis B. Powell Secretary. Funds have already been subscribed by citizens along the route. It is planned that the highway be improved under the direction of Julian Lane, Road Engineer of Muscogee County.

COMING MEETINGS

Nov. 20-22.—Alabama Good Roads Association.—Seventeenth annual convention, Mobile, Ala. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

December 9-12.—American Road Builders' Association.—10th Annual Convention, 4th American Good Roads Congress and 5th Annual Exhibition of Machinery and Materials, First Regiment Armory Bldg., Philadelphia, Pa. Secretary, E. L. Powers, 150 Nassau St., New York, N. Y.

February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

A series of good road meetings will be held at the Congress Hotel, Chicago, Ill., on November 18, 19 and 20. On Tuesday, the 18th, the annual meeting of the International Good Roads and Automobile Association will be held; on Wednesday, the 19th, the National Good Roads Association will hold its annual meeting in conjunction with the Second Woman's Good Roads Convention, and on Thursday, the 20th, the Illinois Good Roads Association will hold its annual meeting. The headquarters of the conventions will be at the Congress Hotel. Maude E. Jones is secretary of the conventions.

PERSONAL NOTES

T. A. Sullivan has been elected Superintendent of Highways of Ballston Spa., New York.

C. T. McCormick of Fredericktown, Mo., has been appointed County Highway Engineer of Madison to fill the vacancy occasioned by the death of Thomas J. Downs.

Edward Beecher of Lestershire, N. Y., has been appointed Highway Inspector by State Commissioner of Highways John N. Carlisle.

A. C. D. Blanchard, formerly City Engineer of Lethridge, Alta., has been appointed Engineer with the Greater Winnipeg Water District.

John C. Underwood, formerly City Engineer of Bowling Green, Ky., and also County Engineer of Warren County, died Oct. 26, aged 73 years.

W. H. Pippin has been employed as a road expert to oversee the construction of 40 miles of macadam road in the Bishop road district, Nueces County, Tex., for which $100,000 of bonds have been issued.

S. H. Reynolds of Victoria, B. C., formerly Assistant City Engineer of Winnipeg, Man., has been appointed a commissioner by the Administration Board of the Greater Winnipeg Water District.

Clarence D. Pollock, formerly an engineer with the Bureau of Highways of New York City and later Engineer in Charge of Paving at Havana, Cuba, has been appointed to take charge of the paving work in San Antonio, Tex., during the next few years. Mr. Pollock's salary will be $6,000 per year.

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State Highway Plans in Wisconsin

Plans for state highway improvement in Wisconsin during 1914, as laid out by the State Highway Commission, call for the expenditure of over $4,000,000 in the construction of 1,400 miles of new roads. This is an increase of 500 miles over the amount of road work done during the current season at a cost of about $3,000,000.

Of the total amount to be spent during 1914 about $1,240,000 will be distributed among the counties. Requests for state aid amounting to over $1,550,000 have been received from the counties, but the amount available falls short of that requested. The discrepancy, however, will be made up by the counties so that altogether the total amount to be spent during the year will be over $4,000,000, as stated.

The commissioners have announced the minimum sums available for distribution among the counties of the state as follows: Adams, $3,240; Ashland, $7,560; Barron, $9,720; Bayfield, $6,840; Brown, $23,760; Buffalo, $8,040; Burnett, $2,640; Calumet, $11,040; Chippewa, $12,720; Clarke, $12,600; Columbia $19,700; Crawford, $6,120; Dane, $57,720; Dodge, $34,200; Door, $7,200; Douglas, $22,080; Dunn, $10,080; Eau Claire, $12,240; Florence, $1,800; Fond du Lac, $29,640; Forrest, $5,280; Grant, $23,160; Green, $19,320; Green Lake, $9,480; Iowa, $16,560; Iron, $3,240; Jackson, $6,960; Jefferson, $23,280; Juneau, $7,440; Kenosha, $19,920; Kewaunee, $8,640; La Crosse, $17,160; Lafayette, $17,280; Langlade, $8,160; Lincoln, $7,920; Manitowac, $23,760; Marathon, $23,240; Marinette, $11,640; Marquette, $920; Milwaukee, $231,720; Monroe, $12,000; Oconto, $9,240; Oneida, $5,880; Outagamie, $24,120; Ozaukee, $9,840; Pepin, $2,880; Pierce, $9,240; Polk, $9,120; Portage, $10,080; Price, $5,280; Racine, $33,000; Richland, $10,060; Rock, $34,680; Rusk, $4,920; St. Croix, $12,000; Sauk, $18,720; Sawyer, $4,320; Shawano, $11,880; Sheboygan, $26,640; Taylor, $5,640; Trempealeau, $10,440; Vernon, $12,240; Vilasfi, $3,720; Walworth, $23,760; Washington, $15,000; Waukesha, $22,560; Waupaca, $13,680; Waushara, $7,920; Winnebago, $29,520; Wood, $12,480.

Boulevard Construction Planned in Savannah, Georgia

At a recent meeting of the county commissioners of Chatham County, Georgia, and 29 of the 46 owners of property along Dale Ave., Savannah, 70 per cent. of the rights of way needed by the county for the construction of a boulevard along that street were promised. It is proposed to widen Dale Ave. to 140 ft., build four permanent roadways and lay out grass plots and set out trees.

The avenue is now 60 ft. wide. The present plans provide for extending the width 60 ft. on the south side and 20 ft. on the north. The estimated cost of the proposed improvement is about $90,000.

The county commissioners, at the meeting, agreed to guarantee to commence the work of construction within the next three years if all of the rights of way were given to the county free of charge. Details for financing the scheme will be worked out later.

Carl Mendel, a prominent realty dealer, owning property along the route of the proposed improvement was appointed to name a committee of property owners to secure assurances of the concessions of rights of way not already promised.

Streets Designated for Improvement in San Antonio, Texas

The Board of Aldermen and City Council of San Antonio, Tex., have decided to order the improvement of four principal thoroughfares as the initial step in the carrying out of the extensive paving plan recently inaugurated.

The thoroughfares, which have been decided upon, are as follows: Garden St. to Pereida, thence along Pereida to South Presa, and along South Presa to the Southern Pacific tracks; Houston St., from the Alamo Plaza to Medina St., Medina, between Houston and Commerce, and West Commerce, between Medina and Zarzamora; Main Ave. from Houston St. to San Pedro Ave., thence along San Pedro Ave. to Mistletoe Ave.; East Commerce St., between Walnut and New Braunfels Ave. These four thoroughfares follow street car lines.

City Engineer Helland has prepared the following estimates of the amount of paving the city will be obliged to do on the main thoroughfares outlined above: Garden St., 280 sq. yds., South Presa, 1,450, Houston St., 3,680, West Commerce, 4,120, Medina, 395, Main Ave., 1,860, San Pedro, 4,470, East Commerce, 9,350; total, 25,905 sq. yds. This amount is in addition to the share of the San Antonio Traction Co. which, under its charter, is required to pave between its tracks.

Fifth Annual Good Roads Exhibition

The good roads exposition which will be held under the auspices of the American Road Builders' Association, in connection with its annual convention and congress, December 9, 10, 11 and 12, in Philadelphia, promises to be the largest and most complete yet attempted. The larger number of exhibits, including those of manufacturers, states, cities and engineering schools, will be placed in the First Regiment Armory, Broad & Callowhill Streets.

The committee in charge of the exhibition states that all the available space in the Armory will be utilized in its efforts to accommodate exhibitors.

In order to provide for the display of some of the heavier machinery a tent will be erected close to the Armory. This will be lighted and made as comfortable as possible, and will enable some of the manufacturers to show their machinery in operation. Outside the tent there will be at least one steam shovel in operation.

Among the applicants for space for commercial exhibits already received are the following:

American Rolling Mill Co.	Middletown, O.
Acme Road Machinery Co.	Frankfort, N. Y.
Ames Road Co.	Easton, Pa.
Bain Wagon Co.	Kenosha, Wis.
R. D. Baker & Co.	Detroit, Mich.
Barber Asphalt Paving Co.	Philadelphia, Pa.
Barrett Manufacturing Co.	New York, N. Y.
Bausch & Lomb Optical Co.	Rochester, N. Y.
"Better Roads"	Jamestown, O.
Bituminized Road Co.	Kansas City, Mo
Blanchard & Hubbard	New York, N. Y.
Bucyrus Company	South Milwaukee, Wis.
Buff & Buff Mfg. Co.	New York, N. Y.
The Philip Carey Co.	Cincinnati, O.
Champion Wagon Co.	Owego, N. Y.
Columbia Wagon Co.	Columbia, Pa.
Concrete Form & Engine Co.	Detroit, Mich.
Dolarway Paving Co.	New York, N. Y.
Dunn Wire-Cut-Lug Brick Co.	Conneaut, O.
The Dustoline For Roads Co.	Summit, N. J.
The Eagle Wagon Works	Auburn, N. Y.
"Engineering Record"	New York, N. Y.
A. B. Farquar Co.	York, Pa.
"Good Roads"	New York, N. Y.
Good Roads Machinery Co.	Kennett Square, Pa.
Galion Iron Works	Galion, Ohio
W. & L. E Gurley	Troy, N. Y.
Wm. G. Hartranft Cement Co.	Philadelphia, Pa.
Hassam Paving Co.	Worcester, Mass.
Headley Good Roads Co.	Philadelphia, Pa.
Robert W. Hunt & Co.	Chicago, Ill.
Charles Hvass Co	New York, N. Y.
Huber Mfg. Co.	Marion, Ohio
Ingersoll Rand Co.	Philadelphia, Pa.
Ingram Richardson Co.	Beaver Falls, Pa.
Jennison Wright Co.	Toledo, O.
Kentucky Wagon Mfg. Co.	Louisville, Ky.
Koehring Machine Co.	Milwaukee, Wis.
Kent Machine Co.	Kent, O.
Knickerbocker Co.	Jackson, Mich.
Keuffel & Esser	Hoboken, N. J.
Lansing Company	Philadelphia, Pa.
Link Belt Co.	Philadelphia, Pa
Locomobile Co. of America	Philadelphia, Pa
Marion Steam Shovel Co.	Marion, Ohio
McAvoy Vitrified Brick Co.	Philadelphia, Pa.
Municipal Engineering & Contracting Co.	Chicago, Ill.
National Paving Brick Mfrs. Ass'n	Cleveland, O.
Oliver Chilled Plow Co.	South Bend, Ind.
Packard Motor Car Company of Philadelphia	Philadelphia, Pa.
H. W. Pickett Co.	Philadelphia, Pa.
Robeson Process Co.	Pennington, N. J.
Rapid Mixer Co.	Grand Rapids, Mich.
J. Jacob Shannon & Co.	Philadelphia, Pa.
Standard Oil Co. of New York	New York, N. Y.
Steel Protected Concrete Co.	Philadelphia, Pa.
Tarrant Mfg. Co.	Saratoga Springs, N. Y.
Texas Co.	New York, N. Y.
Troy Wagon Works Co.	Troy, Ohio
Trussed Concrete Steel Co.	Detroit, Mich.
U. S Asphalt Refining Co.	New York, N. Y.
United Gas Improvement Co.	Philadelphia, Pa.
Union Iron Works	Hoboken, N. J.
U. S. Wood Preserving Co.	New York, N. Y.
Universal Road Machinery Co.	Kingston, N. Y.
Universal Portland Cement Co.	Chicago, Ill.
Warner-Quinlan Asphalt Co.	New York, N. Y.
Waring Underwood Co.	Philadelphia, Pa.
Warren Bros. Co.	Boston, Mass.
Warren Knight Co.	Philadelphia, Pa.
Waterloo Cement Machinery Co.	Waterloo, Iowa
Watson Wagon Co.	Canastota, N. Y.
Wheeling Corrugating Co.	Philadelphia, Pa.
Wheeling Mold & Foundry Co.	Wheeling, W. Va.
Wiard Plow Co.	Batavia, N. Y.
Yellow Pine Mfrs. Association	St. Louis, Mo.

Important Supreme Court Decision in Arkansas

The Supreme Court of Arkansas has handed down a decision which definitely settles the question of whether or not the Legislature had failed to include a provision in the new highway law passed at its last session for improvement district commissioners.

Two cases had come before the Supreme Court, wherein citizens sought to have improvement districts dissolved on the grounds that such provision had been omitted.

In delivering the decision, Chief Justice McCulloch stated that special provision for the appointment of commissioners of improvement districts was not necessary because of the fact that the law did not abrogate the existing statute providing for the commissioners. He stated that "The Legislature might have failed in this"(i. e., making provisions for commissioners), "but they made provisions for their successors, the men to fill their places if they resigned, and as a result did not obliterate commissioners from an improvement district."

Proposed New Boulevard System for Des Moines, Iowa

Plans for a boulevard system for the city of Des Moines, Ia., are being prepared by the Civic Federation of Improvement Leagues of that city.

The subject of the system was given a great amount of publicity three years ago, and a movement was developed tending toward the construction of an elaborate system connecting all city parks and passing through the scenic sections of the city. The plans seemed to be about ready for culmination when the discovery was made that there was no statute providing for the payment of the cost of construction.

H. C. Evans, Attorney of the Civic Federation, endeavored to secure the enactment of a bill providing for the required cost, but the Legislature failed to pass the measure. At the last session, however, a law was passed that is said to be sufficient to meet the demands, in that it gives the city power to construct highways and assess the cost not only on abutting property, but also upon other property in the area of benefit.

At a meeting of the Civic Federation of Improvement Leagues, held Nov. 3, the movement was started with apparent grounds for hope of success. The plans include a highway 30 miles long, extending around the city.

The State Board of Prison Inspectors of Missouri has offered the services of 100 convicts to complete the improvement of a highway between Jefferson City and Columbia, provided the two cities or the county courts of Boone and Cole Counties will pay the cost of maintenance of the convicts while at work. The portion of this highway not yet improved extends from South Cedar City in Callaway County to Ashland in Boone County, a distance of about 18 miles. It is estimated that the cost of maintaining the convicts while completing the work would amount to about $800. It is stated that 600 state convicts are available for work on the highways at present.

Street Improvements in Niagara Falls, New York

The total expenditure for street improvements in Niagara Falls, N. Y., during the year 1913, will amount to $323,993. The work includes the paving of 27 streets, aggregating 6.16 miles in length. Of the total number of streets 22 have been completed, and work is in progress on the remaining five. The total amount already expended for completed work is $309,575, and the cost of uncompleted contracts amounts to $99,025.

The total number of sq. yds. of the various classes of paving already laid, together with the average cost, follow: Asphaltic concrete, 4,972 yds., average cost, $3.29 per yd.; bitulithic, 21,656 yds., average cost, $3.31 per yd.; block asphalt, 17,966 yds., average cost, $3.54 per yd.; brick, 4,244 yds., average cost, $3.31; Hassam, 20,524 yds. average cost, $2.88 per yd.

The several classes of pavement were laid on the various streets as follows: Bitulithic, on Willow Ave., 11th St., 14th St., Robinson Court, and Kosciusko St.; Hassam, on Niagara St., Walnut Ave., Highland Court, 9th St., 25th St., 17th St., and an alley between Walnut and Falls Sts.; Brick, on an alley between Niagara and Central Tracks, an alley between falls and Jefferson, 9th St., Lockport St., 13th St., and an alley between Niagara and Main; Block asphalt, on Chilton Ave., Elmwood Ave., 13th St., North Ave., Lockport St., Weston Ave., and 16th St.; Asphaltic concrete, on Augustus Pl. and Walnut Ave.

The streets on which work is still in progress are 9th St., and an alley between Niagara and Main, which are being paved with brick, and North St., Weston Ave., and 16th St., which are being paved with block asphalt. All contracts call for a 5-year guarantee.

MEETINGS

Georgia-Carolina Good Roads Congress

At the first Georgia-Carolina Good Roads Congress held Nov. 6 and 7 at Augusta, Ga., a permanent organization was formed which will hold meetings annually.

Among those who addressed the association at the morning session, Nov. 6, were E. J. Watson, Commissioner of Agriculture of South Carolina, who opened the meeting; Samuel L. Olive, who addressed the delegates on behalf of the state of Georgia in the absence of John M. Slaton, Governor of Georgia; Judge Wm. F. Eve, of Augusta; Mayor Hayne, of Augusta; G. N. Nixon, who welcomed the delegates on behalf of Richmond County; Col. D. S. Henderson, of Aiken, S. C., and Senator R. B. Blackburn.

The permanent organization of the Georgia-Carolina Good Roads Congress was effected at the evening session, Nov. 6, and the following officers were elected: President, E. J. Watson, Commissioner of Agriculture of South Carolina; First Vice President, Judge William F. Eve, of Augusta, Ga.; Second Vice President, F. H. Hyatt, of Columbia, S. C.; Third Vice President, J. D. Price, Commissioner of Agriculture of Georgia; Secretary and Treasurer, John C. Harper, of Augusta, Ga. It was decided that the next annual congress be held some time during 1914 at Atlanta, Ga.

F. H. Hyatt, of Columbia, S. C., was the first speaker at the eveing session. He was followed by Representative Thomas W. Hardwick, of the tenth congressional district of Georgia, James Byrnes, J. D. Price, Commissioner of Agriculture of Georgia, and S. W. McCallie, State Geologist of Georgia, whose address took the form of an illustrated lecture showing different kinds of road building material.

At the morning session, Nov. 7, resolutions were passed asking the support of the United States Government for the Georgia-Carolina Good Roads Congress and the other associations in the southern section of the United States organized for similar purposes. Representative Hardwick addressed the congress on the subject of the resolutions. The resolutions will be presented to President Wilson and the United States Senate Executive Committee. Following Mr. Hardwick, Joseph F. Gray, of Savannah, Ga., State Railroad Commissioner, and Harry D. Calhoun, of Barnwell, S. C., made addresses.

In the afternoon the delegates participated in an automobile ride through the city.

In the evening the congress closed with a banquet at the Langren Hotel, at which Judge Henry C. Hammond presided.

Birmingham-Montgomery Highway Association

The Birmingham-Montgomery Highway Association was organized at a meeting held at Clanton, Ala., Oct. 22. The purpose of the association is to promote the construction of a road connecting the cities of Birmingham and Montgomery, a distance of 100 miles. About one-third ot the road has already been improved; one-half of the remainder is in fair condition, and the rest is in very bad condition. It is planned to build a road available for traffic at all seasons of the year between the two cities.

At a second meeting held at Clanton, Nov. 10, $12,000 was subscribed for the work in Chilton County.

The following officers were elected: President, W. S. Keller, State Highway Engineer of Alabama; Vice President, Judge Dan Green, of Birmingham; Secretary, Barney M. Roberts, of Clanton; Treasurer, Grady Reynolds, of Clanton.

The Blaine County Good Roads Association held a meeting at Hailey, Idaho, Oct. 17, in the interest of a bond issue for the purpose of improving the roads of the county. A resolution was adopted favoring the establishment of the Sawtooth National Park in the Sawtooth Mountains in Blaine County.

A meeting held at Temple, Tex., Oct. 25, was attended by business men of the city. The proposition to incorporate Temple and the surrounding country in a road district and to vote bonds to the amount of $500,000 for improving its roads was unanimously endorsed.

About sixty citizens of Kern County, Cal., attended a banquet given at the Southern Hotel in Bakersfield, under the auspices of the Bakersfield Realty Board, and discussed ways and means of purchasing $100,000 of state highway bonds. A committee has been named by Chairman Jastro of the County Board of Supervisors to canvass the county for funds. The purchase of the bonds is made contingent upon the expenditure of $150,000 by the state for the purpose of completing the projected state highway through the county.

The first annual conference of the Superintendents of State Highways of Pennsylvania was held at the offices of the State Highway Department of Pennsylvania, at Harrisburg, Oct. 22. State Highway Commissioner Bigelow addressed the superintendents, outlining the work for the coming winter and spring. The superintendents reported on their work for the year, and submitted inquiries and problems for discussion. Instructions on the winter work, which will consist of emergency repairs, and of the spring work, which will consist of general repairs, were given the superintendents by Commissioner Bigelow. The extent of the spring work will depend largely on the outcome of the pending suit which is being conducted to determine whether or not the income from automobile licenses can be devoted to highway purposes, as provided by the state law enacted in 1913.

At a recent meeting of the Press Association of Grayson County, Tex., a resolution was adopted to the effect that the association would cooperate with the Sherman and Denison Chambers of Commerce in the matter of organizing the Oklahoma, Texas and Gulf Highway Association, the purpose of which will be to promote the construction of good roads between the Red River and the Gulf of Mexico.

The third annual meeting of the Arizona Good Roads Association was held Nov. 6 in the Board of Trade Rooms at Phoenix. It was decided that the association affiliate with the National Highways Association and the organization will hereafter be known as the Arizona division of that organization. W. A. Alsdorf, Organization Manager of the National Highways Association, was present and addressed the meeting.

The first banquet of the Manitoba Good Roads Association, held at the Industrial Bureau, Winnipeg, Oct. 29, was attended by about 110 farmers of the surrounding municipalities and several representatives of the Winnipeg City Council. The banquet was made the occasion of the awarding of prizes won in a split-log drag competition held recently under the auspices of the association. Reeve Henderson, of Kildonan, president of the association acted as toastmaster.

A meeting of the North Carolina division of the Southern National Highway Association was held in the ballroom of the Langren Hotel, Asheville, N. C., Nov. 7. Among the speakers were Dr. Joseph Hyde Pratt, State Geologist of North Carolina, who outlined the progress of the work being done along the line of the Central Highway, a part of the Southern National Highway, and Col. Dell M. Potter, of Clifton, Ariz., President of the Southern National Highway Association.

The Central Avenue Improvement Association was organized at a meeting held Oct. 28 at Los Angeles, Cal. The object of the association is to promote the widening to 80 ft. of Central Ave., between Nadeau and Delphi Sts., a distance of about 3 miles. W. W. Mines was elected President, Frank Griffith Vice President, J. S. Torrance Treasurer, and John C. Hamm Secretary. President Mines was instructed to appoint several committees to take charge of the work of the organization.

The promotion of the proposed Corinth to Jackson Highway was the chief topic of discussion at a meeting of the Selmer Business Men's Club, held at Selmer, Tenn., Oct. 24. The principal speaker was Clopton Thomas, Secretary of the Corinth Business Men's Association. It is proposed that the highway connect with the Washington to Memphis and the Memphis to Bristol Highways at Jackson and with the Corinth to the Gulf Highway at Corinth. A meeting of the executive committees organized in the counties of Madison, Chester McNairy and Alcorn will be held at Selmer on Dec. 1.

The Borderland Route Association was organized recently at a meeting held at Phoenix, Ariz., in the interest of a proposed automobile highway from Galveston, Tex., to Los Angeles, Cal., to be open for travel throughout the entire year. F. I. Meyers, of Tucson, Ariz., who was elected president of the association, was authorized to correspond with the cities and towns between El Paso and Galveston, urging the organization of local branches for the purpose of putting the roads in their immediate sections in shape, and connecting with the western section of the proposed highway at El Paso. It is stated that the western division of the highway is already in good condition.

COMING MEETINGS

December 9-12.—American Road Builders' Association.—10th Annual Convention, 4th American Good Roads Congress and 5th Annual Exhibition of Machinery and Materials, First Regiment Armory Bldg., Philadelphia, Pa. Secretary, E. L. Powers, 150 Nassau St., New York, N. Y.

February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

The next convention of the Texas Good Roads Association will be held at Fort Worth Jan. 26 and 27.

The first Canadian Good Roads Congress will be held at Montreal in January, 1914. Delegations are expected from road associations, boards of trade, Canadian municipal, provincial and federal governments, the Automobile Club of Canada, and various other organizations interested in good roads. It is stated that an exhibition of road materials will be held in connection with the congress.

PERSONAL NOTES

William H. Shelton has been elected City Engineer of Dunkirk, N. Y.

George H. Blodell has resigned his office as Superintendent of Street Maintenance of Duluth, Minn.

Albert B. Stetson, consulting engineer and former Vice President of the Bucyrus Company, South Milwaukee, Wis., died Nov. 7 at the age of 82 years.

W. J. Roberts, State Highway Commissioner of Washington, has been appointed consulting engineer in connection with the construction of the projected $3,000,000 system of county roads in King County, Wash.

Caleb S. Kenney, County Road Engineer of Kent County, Del., for the past year, resigned his office Nov. 4, his resignation becoming effective within 60 days. It is understood that Mr. Kenney will become connected with the engineering staff of a mining company.

W. E. Howden, of Collinsville, Ill., has been elected County Highway Superintendent of Madison County, Ill., for a term of six years. Mr. Howden's salary for the first two years has been fixed at $1,500 per year, and for the remaining years at $1,800.

Frederick Howitt, an engineer of the Lincoln Park Board of Chicago, Ill., since 1907, has resigned. He is at present acting as Engineer to the Board of Local Improvements, Town of Lake View, Chicago, in charge of the reconstruction of the Sheridan Road between Foster and Devon Aves. It is stated that he will later resume practice as consulting engineer in paving and road construction.

Charles H. Sweetser, M. Am. Soc. C. E., Senior Highway Engineer, U. S. Office of Public Roads, has been granted a leave of absence for the purpose of supervising the construction of improved highways in Calcasieu Parish, La. The highways will be built with the proceeds of the $900,000 bond issue recently authorized by the voters of the parish. Mr. Sweetser is a graduate of the Leland Stanford University, and also studied at the Massachusetts Institute of Technology. In 1904 he was appointed Highway Engineer for the Department of Public Works of Hawaii. From 1907 to 1909 he was Supervising Engineer of improved highways for the State Highway Department of Washington, and between 1909 and 1911 he was Chief Engineer of that office.

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A Weekly Journal of Road and Street Engineering and Contracting

Old Series, Vol. XLIV.
New Series, Vol. VI.

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New Mountain Highway in Utah

The work of surveying the route of a new road from the mouth of Parley's Canyon to the Salt Lake-Summit County line, in Utah, has been practically completed under the direction of the State Road Commission, the Salt Lake County Surveyor, and the County Superintendent of Roads.

This road will form a part of the new Salt Lake County boulevard system, to pay the cost of which the county commissioners are preparing to ask for a bond issue of $1,000,000. The existing road between the two points, although in good condition, is dangerous, because of the fact that in addition to many sharp turns, the road crosses the Park City Branch of the Denver & Rio Grande R. R. eleven times in less than four miles. Some of the crossings are of a dangerous character. The new road will eliminate many of these crossings, and a number of the sharp turns. It is planned that the road be extended from the mouth of Parley's Canyon along 12th South St. to State St., thence south to 14th South in Salt Lake City, and west to the Tooele County line. It is expected that the actual work of constructing the road will commence early next spring.
Fort Worth, Texas, to Improve Streets Connecting with Tarrant County Highway System.

Grade Crossing Elimination in Cincinnati, Ohio

Bids were received Nov. 24 by the Director of Public Service of Cincinnati, O., for the construction of a reinforced concrete viaduct over Spring Grove Ave., the tracks of the B. & O. S. and the C., H. & D. railroads and Mill Creek at Hopple St.

The work will be done in connection with plans to eliminate grade crossings at that point which, in addition to the viaduct, include the construction of paved approaches, retaining walls and cement sidewalks.

The viaduct will be 1,930 ft. long, exclusive of approaches, and 60 ft. wide. It will consist of arched cantilever beams supported on piers. Spans will vary in length from 70 to 80 ft. The roadway, 46 ft. wide, will be of beam and slab construction, paved with wood blocks. Two 7-ft. cement sidewalks provided with cement guard rails will run along either side.

The contract calls for the following approximate quantities: Trench excavation, earth, for footings of piers, retaining walls, etc., 11,000 cu. yds.; trench excavation, rock, 2,000 cu. yds.; concrete pilings under piers, 43,000 lin. ft.; reinforced concrete in piers and footings, 10,000 cu. yds., in retaining walls, 700 cu. yds., in superstructure, 11,100 cu. yds., total, 21,800 cu. yds.; grading, excavation, 8,700 cu. yds.; 12-in. drains, 900 lin. ft.; manholes, 3; inlets, 7; granite curbs, 1,000 lin. ft.; concrete base for paving, 500 cu. yds.; granite block pavement, 1,400 sq. yds.; wood block pavement, 11,000 sq. yds.; cement sidewalks, 8,500 sq. ft.

Fort Worth, Texas, to Improve Streets Connecting with Tarrant County Highway System

The city of Fort Worth, Tex., has commenced the work of paving its streets connecting with those highways of the Tarrant County road system which are being improved under the $1,000,000 bond issue authorized a year ago.

Under the highway laws the county highways can extend only to the city limits, and in many cases a gap is left between the improved streets of the city and those of the county. The plan of the city is to improve these intervals and form through connected thoroughfares from the heart of the city into the country districts.

The first streets to be improved under this policy are North Main St., beyond Exchange Ave., and the Cold Springs Rd. The latter improvement will connect the Keller Rd. with Samuels Ave. The connecting links will be improved by the city as fast as county system roads are built to the city line.

Proposed Street Improvement in Berkeley, California

As the first step towards the beautifying of Berkeley, Cal., E. Q. Turner, Commissioner of Public Works, has prepared and submitted to the City Council plans for a comprehensive system of street improvement involving the following thoroughfares:

Grove St., between Allston Way and the south city line; Adeline St., between Ward St. and the south city line; Dwight St., between Grove and Piedmont Aves.; Bancroft Way, between Barrow St. and College Ave.; Ashly Ave., between Telegraph and College Aves.; University Ave., from 100 ft. west of Grove Ave. to Third St.; Centre St., between Milvia and Grove Sts., and Allston Way, between Dana and Fulton Sts.

Mr. Turner also recommends that sidewalks be laid on Centre St., between Shattuck Ave. and Grove St., and on Allston Way, between Shattuck Ave. and Grove St.

Tentative Plans for Street Extension in the Borough of Brooklyn, New York City

The Brooklyn Committee on City Plan is exhibiting at 180 Montague St., Borough of Brooklyn, New York City, tentative plans for the extension of certain thoroughfares in the borough to take care of the increasing traffic as the population of the borough grows.

The plans were prepared for the Brooklyn Committee on City Plan by Edward H. Bennett, after careful consideration of the problems of traffic which will be encountered in the future, using a population of 6,000,000 as a basis. The present and probable future trend of traffic were also considered, and the plans were evolved by working out the shortest distances between important points and the elimination of topographical obstacles which now hinder direct travel. The through thoroughfares in the Borough of Queens, lying contingent to Brooklyn, also have an important bearing on the plans.

Mr. Bennett divides his suggestion into two parts, styled, respectively, the first and second periods of execution. Under the first period he groups the establishment of new streets and the widening of existing streets, which in his opinion are absolutely necessary at present. Under the second period he includes tentative suggestions for the future. His plans involve the improvement, extension or creation of twenty-six principal routes.

A map outlining the proposed improvements is included in the exhibit. Among the improvements suggested as shown on the map is the widening of Manhattan Ave. between Vernon Ave. Bridge and Noble St., over Newtown Creek. From Noble St. the route is continued by way of a newly established street from the intersection of Manhattan Ave. and Noble St. to the intersection of Wythe Ave. and Barker St.; Wythe Ave. is widened from Barker St. to Division Ave., and is there continued over a viaduct crossing the Wallabout Market along Washington Ave. into Park Ave. This viaduct will eliminate heavy grades and relieve the congestion now prevalent about the market. Both the new cuts and the widenings of this route are included in the first period of execution.

Another suggestion provides for the continuation of Bedford Ave. from Haywood St. to the Williamsburg Bridge Plaza, and the widening of Bedford Ave. between Haywood St. and Grant Square. At present the heavy traffic on Bedford Ave. is hindered greatly by the fact that it is forced to proceed through narrow circuitous streets to the Williamsburg Bridge Plaza on account of the sharp turn of Bedford Ave. at Haywood St.

A third route is provided by the establishment of a new street from Union Ave. and Meserole St. to Flushing Ave. and Beaver St. and for the widening of Beaver St. between Flushing and Myrtle Aves.

A fourth route will be obtained by cutting a new street between the intersection of Vanderbilt and Atlantic Aves. and the intersection of Flushing and Marcy Aves., the widening of Gerry St. from Flushing and Marcy Aves. to Moore St.; the widening of Moore and Thames Sts. to Flushing Ave., and the widening of Flushing Ave. from that point to the borough line.

One of the routes to be considered as one of the improvements in the second period of execution will be established by cutting a new street from the junction of Howard Ave. and Broadway to the junction of Linden St. and Bushwick Ave., and from that point to the intersection of Knickerbocker Ave. and Thames St., thence by way of Knickerbocker Ave. to Morgan Ave., and along Morgan Ave. to Meeker Ave., thence by way of Hausman St. to Front St., to Sutton St., to Paidge Ave., to Ash St., to Commercial St. All of the streets involved in this route will be widened under the plan.

The exhibit is said to have attracted considerable attention and was visited Nov. 20 by Lewis H. Pounds, President of the Borough of Brooklyn, and sixteen members of the borough government, including Alfred E. Steers, now City Magistrate, formerly Borough President of Brooklyn, George W. Tillson, Acting Commissioner of Public Works, Thomas B. Wineburgh, Deputy Commissioner of Public Works, Charles R. Ward, Chief Engineer of the Topographical Bureau, H. H. Schmidt, Chief Engineer of the Bureau of Highways, John W. Tumbridge, Superintendent of Highways, Austin E. Allen, Engineer with the Bureau of Highways, and Arthur C. Forbes, Assistant Engineer of the Topographical Bureau.

New Assessment Plan for Salem, Oregon

The City Council of Salem, Ore., has passed an ordinance outlining a new plan for assessing the cost of street improvements, to be submitted to the voters at an election to be held Dec. 1.

The scheme was devised by City Engineer Tillman in an effort to secure a more scientific and equitable method of levying taxes upon benefited property that would give justice to the owners of small lots and not force them to sell their holdings for less than the cost of projected improvements.

The plan is designed to make property along the line of proposed improvement proportionately responsible for the cost. In order to do this, the ordinance provides for the division of the lots in each quarter block into three zones lying parallel to the street to be improved. The first zone, lying next to the street, will bear 50 per cent. of the cost, the next 30 per cent. and the third, or outer zone, 20 per cent. Intersections are to be assessed on all three zones proportionately. Alleys will be treated in the same manner. Irregular parcels of land which are at present the cause of considerable trouble in the matter of assessing improvement costs will have the cost distributed according to area.

This is the fourth attempt that has been made to get an assessment measure adopted by the voters. Each of the other three ordinances has been involved with other issues, resulting in confusion to the voters.

Considerable New Highway Construction, together with the erection and repair of several bridges is planned for next year in Sangamon County, Ill. The first work to be taken up will be the erection of a bridge in Rochester Township, to cost in the vicinity of $8,000, and the construction of approaches to a bridge in Cooper Township. During the winter a systematized plan for road dragging will be evolved by the county commissioners.

Plans for Raising a Million Dollars to be expended on the Lincoln Highway are being perfected by members of the Automobile Club of Northern California in San Francisco. Various means of raising this sum will be used in the campaign. Club memberships will be sold and there will be voting contests in addition to the sale of the official contributor's certificates. At a meeting of representative business men held at the Valoncia Theatre on Nov. 19 plans were discussed at length.

According to the Report of the Executive Committee of the National Commission on Prison Labor, laws have been passed by thirteen states during the present year authorizing the use of convicts in the construction and maintenance of highways. The states passing legislation favoring the use of convicts in road work are: Indiana, Kansas, Maine, New Jersey, Arkansas, Delaware, Florida, Illinois, North Dakota, Pennsylvania, Vermont, West Virginia and Wisconsin.

The Commissioner's Court of Teague, Tex., has directed that an election be held Dec. 16 to decide whether two precincts of Freestone County shall issue bonds to the amount of $150,000, the proceeds to be used in road construction. If the bonds carry macadamized roads will be built along the entire length of the Trinity & Brazos Valley Railroad, connecting the main trade centres. The Teague Business Men's League is behind the project.

New Thoroughfares Planned in St. Paul, Minnesota

The Department of Public Works of St. Paul, Minn., is developing a plan for converting Rice St., Main Ave. and W. 7th St. into a continuous thoroughfare through the heart of the city. The plans include the elimination of the sharp angle at Main Ave. and W. 10th St., and the extension of Rice St. to Main Ave., leaving a triangle for park purposes, bounded by Rice and W. 10th Sts. and Main Ave. If the improvements planned are accomplished, a through route will be established from the Hill farm, 10 miles north of St. Paul, to Fort Snelling, a total distance of more than 15 miles.

Plans, specifications and estimates for opening 9th St. between Summit and Smith Aves., and the widening of W. 4th St. at Seven Corners are being prepared by City Engineer Claussen, and are nearing completion. It is expected that the actual work of construction will be started in the spring.

Plans for New York State Highways

State Commissioner of Highways John N. Carlisle of New York has prepared a tentative list of roads that will be put under construction this year, and for which bids will be called as soon as plans and specifications can be completed.

This list is not final, and may be changed at any time, it having been drawn up for the purpose of giving contractors an opportunity to look over the roads before they are covered with snow.

The territory in which the proposed work will be done includes 49 counties in portions of all of the nine state highway divisions as follows: Division 1—Columbia, Dutchess, Greene, Nassau, Orange, Rockland, Suffolk, Ulster and Westchester Counties; Division 2—Albany, Clinton, Essex, Saratoga, Schenectady and Warren Counties; Division 3—Franklin, Jefferson, Lewis, Oneida and St. Lawrence Counties; Division 4—Herkimer, Madison and Oneida Counties; Division 5—Broome, Chenango, Delaware, Otsego, Schoharie and Sullivan Counties; Division 6—Cayuga, Cortland, Onondaga, Oswego and Wayne Counties; Division 7—Livingston, Monroe, Ontario, Orleans and Wyoming Counties; Division 8—Allegany, Chemung, Schuyler, Steuben, Tioga and Tompkins Counties; Division 9—Cattaraugus, Chautauqua, Erie and Niagara Counties.

Construction of Patrol Road Planned in Minnesota

The East and West State Highway Association, of St. Paul, Minn., has recently received assurances from George W. Cooley, Secretary of the Minnesota State Highway Commission, that work of construction of the proposed patrol road to stretch across the state will be commenced shortly. The road, which will be the first of its kind to be built in the state and one of the first in the country, will pass through Ramsey, Hennepin, Wright, Meeker, Kandiyohi, Swift, Stevens and Big Stone counties, and into Traverse county, linking together thirty-four towns.

At a meeting of the directors of the East and West State Highway Association held recently in St. Paul, reports were read showing that the commercial clubs along the route of the proposed highway, county boards, and village and city councils, have adopted resolutions favoring the project. It was also stated at that time that all counties benefiting by the proposed road are ready to make the required appropriation. The sum of $15,000 has already been appropriated by Stevens county.

The proposed patrol road will be constructed under the provisions of the so-called Dunn good road act. The total amount now available for road building next year by the state highway commission amounts to $1,500,000.

The East and West Highway, as the patrol road will probably be designated, will be 184 miles in length, the longest continuous highway in Minnesota.

Annual Good Roads Exhibition

In last week's issue of "Good Roads" a list was given of seventy-six commercial exhibitors to whom assignments of space had already been made in connection with the good roads exhibition in Philadelphia, December 9, 10, 11 and 12. This makes the number of exhibitors considerably larger than has ever before participated in any of the good roads exhibitions held under the auspices of the American Road Builders' Association.

The Convention Committee reports that more applications for space in the Armory have been received than it is possible to accommodate, but it is hoped that by getting some of the exhibitors to show their machinery in operation in the tent which will be erected near the Armory, some of the space in the building will be released, thereby making it possible to accommodate some at least of those by whom applications have been filed.

It is believed that the exhibits shown in the tent will prove to be a most popular part of the exhibition, for much of the machinery which will there be shown will be in operation. This will include concrete mixers, tractors, crushers, etc. So far as possible, the machinery will be shown under actual working conditions. One of the exhibits, and one which will probably require more space than any other, will be that of the Bucyrus Company, which will show a steam shovel in operation. This exhibit, of course, will be outside the tent.

From present indications, the officials of the American Road Builders' Association having the matter in charge are confident that the forthcoming exhibition will be by all odds the largest and most complete that has ever been held anywhere. Efforts have been made to secure for this exhibits of the newest labor-saving machinery. Many exhibitors will show departures in their respective lines. As compared with last year's exhibition, there will be a much greater number of concrete mixers, and the motor truck for hauling materials will be in evidence, as will also the automobile hauling train.

Several of the states will make exhibits this year who did not take part in last year's display. The road models of the United States government will be shown. One or more of the Canadian provinces will exhibit.

Altogether, the exhibition promises to give buyers and users of road machinery and materials an opportunity for inspection and comparison such as they have never before had offered them.

Plans for Street Improvement in Ottawa, Ill., call for the expenditure of approximately $280,000 on about 170 blocks on the west side of the city.

Road Improvement Bonds to the amount of $700,000 have been sold by the Marion County, W. Va., Court to Otis & Company of Cleveland, the Fifth National Bank of Cincinnati, and Hayden, Miller & Co. of Cincinnati.

Plans and Specifications Have Been Completed by City Engineer Emmett Sweetman of Springfield, O., for the paving of a number of streets. The plans contemplate the improvement of Main St., from Washington Ave. to the southern corporation line; Miami St., from the square to the Pennsylvania railroad tracks, and a considerable portion of Scioto St.

A Number of Citizens of Versailles, Mo., have organized a stock company and have purchased a $5,000 road working outfit in order that work may be started at once on the Springfield road running south from Versailles. The membership of the organization includes J. A. Petty, J. T. Washburn, A. L. Ross, F. A. White and P. H. Antweiler.

According to the Report of J. T. Gorman, State Examiner of Alabama, recently filed with Governor O'Neal, more than $500,000 has been expended by the state and its counties in highway improvement since the creation of the State Highway Department in April, 1911. During the year the Highway Commission has spent $182,583.98, which is an increase of $123,462.05 over the preceding year. The sum of $232,000 has been appropriated to counties, contingent upon the expenditure of a like amount by the counties in the construction of state aid roads.

Plan Street Extension in Trenton, New Jersey

Acting upon recommendations incorporated in a message submitted by Mayor Donnelly, the City Commissioners of Trenton, N. J., have adopted a resolution directing the City Engineer to prepare plans for the widening and extension of Montgomery St., to Centre St.

In his message Mayor Donnelly pointed out that within the last decade East St. and North and South Broad Sts. have grown from ordinarily busy thoroughfares to streets which are always more or less congested. This is especially true of that portion of East St., between the Delaware and Raritan canal on the east and Willow St. on the west. South Broad St., between State St. and Montgomery St., is nearly, if not equally, as inadequate to accommodate the rapidly increasing traffic, and it is to relieve this congestion that Mayor Donnelly recommends the widening and extension of Montgomery St., which will afford a wide, straight avenue for traffic between South Trenton and North Trenton.

According to Mayor Donnelly's message, the widening of Montgomery St. would necessitate the acquisition of a strip of land about 29 ft. wide on the east side of the thoroughfare, extending the length of the block between State and Front Sts. The consummation of the proposed improvement would involve acquiring parts of three real estate holdings.

Mr. Donnelly points out that the consolidation of Centre and Montgomery Sts. should be accomplished without difficulty from an engineering standpoint. The topographical location of the thoroughfares is particularly fortunate, as their contours are in almost perfect alignment, and all that is necessary to connect them is to remove the few intervening residences.

An ordinance providing for the widening of Montgomery St., between State and Front Sts., is now in the hands of the Mayor, who will present it to the Board of Commissioners for consideration.

MEETINGS

The Lion County Good Roads Club was organized at a meeting held at Tallahassee, Fla., Nov. 14. The membership of the new organization includes professional and business men of Tallahassee and farmers of the surrounding country. The primary object of the club is to promote the dragging of all the roads leading out of Tallahassee for a distance of five miles. The following officers were elected: President, Dr. W. E. Van Brunt; Vice President, Mr. McCaskill; Secretary and Treasurer, P. T. Nicholson.

The Lincoln Highway Association, of Alliance, O., was organized at a meeting held in the rooms of the Alliance Advertising Association, Nov. 14. The organization will endeavor to have the proposed transcontinental road known as the Lincoln Highway pass through Alliance by way of Beaver Falls, Pa., and East Palestine, Leetonia and Salem, O. Present plans do not include Alliance in the route of the road. The following officers were elected: President, Col. W. H. Morgan; Vice President, O. F. Transue; Secretary, A. F. Morris; treasurer, Dr. C. S. Hoover.

Two meetings to celebrate the anniversary of Lincoln's address at Gettysburg and to further the Lincoln Highway movement were held recently at Sterling and Rock Falls, Ill., under the auspices of the Good Roads Committee of the Sterling and Rock Falls Commercial Club. The first was a mass meeting held in the Opera House at Sterling in the afternoon of Nov. 19. The second was held in the evening of the same day at Rock Falls. A. R. Pardington, Vice President of the Lincoln Highway Association, was one of the speakers. H. H. Hohlsea, editor of the Chicago Inter-Ocean, spoke on "The Relation of the Press to Good Roads."

At a recent meeting of the Texas Good Roads Association at Dallas, action was taken which resulted in the amalgamation of the organization with the National Highways Association of which it will be the Texas Division.

The citizens of Tama County, Ia., have issued a friendly challenge to the citizens of other counties in Iowa through which the Lincoln Highway will pass to see which county will improve its section first. At a recent mass meeting the following resolution was adopted: "That Tama County challenges the other twelve counties in Iowa, across which this great way is laid, to a friendly rivalry in the effort to make the prospectus of the Lincoln Highway a splendid realization at the earliest possible day."

At a meeting held at Denison, Tex., Nov. 18, The Oklahoma, Texas and Gulf Highway Association was organized for the purpose of promoting the improving and maintaining of an automobile highway between Dallas, Tex., and Oklahoma City, Okla., passing through Denison, Sherman and McKinney, Tex., and Durant, Milburn, Purcell and Paul's Valley, Okla. The route is now open and has been logged between its proposed terminal points. It is now planned to improve it still further. It will be a connecting link in the Winnipeg to the Gulf Highway. The following officers were elected: President, W. J. Milburn, Milburn, Okla.; Vice Presidents, E. H. Hughes, Denison, and A. N. Leecraft, Colbert; Secretary, L. M. Ward. W. N. King is Chairman of the Publicity Bureau.

COMING MEETINGS

December 1-3.—American Automobile Association.—Annual Convention, Richmond, Va. Chairman, Executive Board, A. G. Bachelder, 437 Fifth Ave., New York, N. Y.

December 1-3.—The Quebec-Miami International Highway Association.—Annual Meeting, Richmond, Va. Secretary, Norman M. Parrott, Calvert Bldg., Baltimore, Md.

December 9-12.—American Road Builders' Association.—10th Annual Convention, 4th American Good Roads Congress and 5th Annual Exhibition of Machinery and Materials, First Regiment Armory Bldg., Philadelphia, Pa. Secretary, E. L. Powers, 150 Nassau St., New York, N. Y.

January 26-27.—Texas Good Roads Association.—Annual meeting, Fort Worth. Secretary, Homer D. Wade, Stamford, Tex.

February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

PERSONAL NOTES

Arthur L. Webster, of Wheaton, Ill., has been appointed Highway Engineer of Du Page County, Ill.

Leonard W. Rundlett, City Commissioner and City Engineer of Moose Jaw, Sask., has resigned and will close his connection with the office, Jan. 1, 1914.

Frank A. Kattman will, on Jan. 5, 1914, become City Engineer of Terre Haute, Ind. Mr. Kattman is now City Engineer of Brazil, Ind.

C. Willis Adams has been appointed assistant to the president of the Link Belt Co., of Chicago, Ill. Mr. Adams was formerly Superintendent of the Philadelphia works of the company, in which office he is succeeded by Frank Oakes, formerly general shop foreman of the Chicago factory.

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BUSINESS METHODS IN HIGHWAY WORK

If privately owned turnpikes formed the principal channels of primary transportation today as they did in some sections of the country a hundred years ago it is probable that their ownership would be vested in a few big corporations and that the roads would be built, maintained and operated by the same business methods that are employed in large modern corporations such as railroad companies.

The era of privately owned toll roads, however, has passed, probably for good, and in their place we have public highways constructed and maintained by the public through state and other highway departments. With the exception that the profits from the use of the roads are not returned so directly to the owners as they were under the turnpike system, the conditions are entirely comparable and it would be reasonable to expect that the administration of road affairs would be upon a business basis. Although the administration of road work in many states and counties justifies such an assumption there are not a few where the work is carried on without much reference to even the most fundamental principles of business and probably in only a very few is it conducted in as systematic and careful a way as are the majority of up-to-date private enterprises.

On other pages of this issue are two articles dealing with this subject. One is an abstract of a paper by Halbert P. Gillette, and the other is an abstract of a paper by Chief Engineer H. G. Shirley of the Maryland State Roads Commission. The first deals with methods of accounting and the second is an exposition of the details of one very important part of the business of highway departments—the purchasing of supplies.

Perhaps the most important matter brought out in the paper first mentioned is the separation of expenditures. Properly segregated accounts are essential to the businesslike conduct of affairs because they show clearly the purposes for which money has been expended and because they present data which must be had if future work of a similar character is to be carried on with the maximum efficiency and economy. In highway work such data are particularly useful in determining the type of road to be built in any given case.

The nature of the improvement of any road or street should be governed by the amount that can justifiably be expended. This sum can be determined, within limits, by an investigation of the traffic the road may be expected to carry. Having ascertained the amount which may be properly applied to the work, the next step is to select a pavement which can be put down for the money available. The actual cost of a pavement is not its first cost only, but a combination of the first cost and other costs incurred during the pavement's life. These can be determined only from corresponding figures obtained from past work and unless adequate records are kept, road builders have no data upon which to base their calculations.

The keeping of detailed cost records for a large mileage of highways is, of course, an expensive work, especially since the failure to keep such records in the past makes necessary a large amount of labor that would be unnecessary had business methods always obtained. At the same time, the value of the records is so great that the work would soon pay for itself and would later yield large returns.

HIGHWAY ENGINEERS AND THE PUBLIC

Discussions of the relations of the general public and the engineer, both in his professional capacity and as a private individual, have lately assumed considerable prominence in engineering publications. It has been argued frequently that engineers take too little part in public affairs except as such participation falls within the sphere of their duties and that they do not put themselves and their work forward to the same extent that members of other professions do. It is contended that because of this attitude the public not only underestimates the value of the engineer's services but that a distinct public loss is occasioned by the failure of engineers to bring their knowledge and experience to bear in the shaping of public opinion regarding public work.

Highway engineers, because of the nature of their work, are more prominently before the public than are engineers engaged in other lines. People in general are more interested in road work than in the majority of other public enterprises for the reason that all have occasion to use the highways. The condition of roads and streets is a matter of immediate, personal concern to the majority of people because it affects their convenience and often their business. It is also true that while road building is an art by no means simple yet almost every layman feels competent to say how roads should be built, if not to build them himself.

For these reasons the work of the highway engineer is more often the subject of lay discussion than are other branches of engineering. Such discussion is not always intelligent and there is room for a great deal of activity on the part of highway engineers in bringing their work before the people in such a way as to make clear some of the points upon which the general public should be better informed. And the lively interest which the public takes in road work renders their failure to do so the less excusable.

It is not necessary that the ordinary citizen should have a thorough knowledge of road building, for road building is a work requiring the services of specialists to whom it should be left. At the same time it is desirable that the taxpayer should know enough concerning the fundamental principles involved in financing, building and caring for roads so that he will at least realize his own limitations and be willing to leave the work to those especially fitted to handle it, just as he leaves legal and medical matters to his lawyer and his doctor. Highway work is public work, and as the money to pay for it comes, in one way or another, from the taxpayers, it is to be expected that they shall have a voice in the manner of its expenditure.

No doubt the money indicated for highway improvement is often expended injudiciously. In such cases the waste is the result of a lack of information as to the wisest public policies in road work, for no body of taxpayers would intentionally provide funds to be carelessly or dishonestly disbursed.

The function of the highway engineer, as of every other engineer, is to so order his work as to make it produce the most for the money which it costs. If the highway engineer is competent he knows what methods will produce the best results in any given case, and it is his duty as a citizen to do what he can to insure the economical expenditure of public funds through the wise administration of highway work. His knowledge and experience enable him to put before the public the salient point of any proposed policy and to indicate wherein it is wise or unwise, and by so doing he will be performing his duty not only to the public but also to his profession.

The highway engineer can be particularly useful in this respect in connection with the matter of federal aid. Present indications are that participation in road building by the national government is to come, though there seems to be no general agreement as to how it will be taken up. There have been proposed almost as many different ways of providing federal aid as there are advocates of it, and it is evident that much must be done before any plan can be submitted which will enlist sufficient support to insure its adoption. Opinions differ as to the advisability of federal aid and as to how it should be granted, if granted at all, but all engineers know that to be successful it must be applied in accordance with certain fundamental principles which are not generally understood by laymen. Many of the questions involved are engineering questions and no satisfactory plan will be worked out unless they are solved as such. The matter will finally be passed upon by the voters, through their representatives, by the acceptance of some proposed plan that meets with favor. Whatever engineers can do in the way of molding public opinion to support wise plans and defeat unwise ones will be a service to the country and to their own profession.

The Taxpayers of Taylor, Williamson County, Tex., are said to be promoting a bond issue in the sum of $200,000, the proceeds to be used in the maintenance of the $500,000 system of county highways already built, and for the construction of additional roads. It is expected that an election will be held some time before the end of this year.

Street Improvements in Tacoma, Wash., contracted for and completed during 1913, under the supervision of Commissioner of Public Works Woods, cost $361,140.59. Asphaltic concrete was used on 2.3 miles of streets, sheet asphalt on 1.54 miles, brick on .03 mile and concrete on .35 mile. The brick and concrete were used in alleys exclusively. Grading and the construction of walks cost $94,672.89; paving, $182,189, and sewers, $1,158. In addition to the above, two sidewalk contracts amounting to $22,000 were let recently. Sidewalks having a total length of 30 miles have been constructed or contracted for. On Jan. 1, 1913, work was still uncompleted on over 7.5 miles of paving contracts awarded during 1912.

The County Court of Montgomery County, Tenn., has elected a commission of seven citizens of the county to supervise the expenditure of $100,000 in improving the roads of the county. The 22 civil districts of the county have been divided into 7 road districts. Expenditures in Road District No. 1, composed of civil districts 1, 2 and 6 will be under the supervision of H. E. Bryan; those in Road District No. 2, comprising Civil Districts 3, 4 and 7, will be under the supervision of W. D. Elliott; those in Road District No. 3, comprising Civil Districts 8, 9 and 21, will be under the supervision of A. B. Cherry; those in Road District No. 4, comprising Civil Districts 5, 11 and 12, will be under A. B. Killebrew; those in Road District No. 5, comprising Civil Districts 10, 14 and 15, under Vernon Brewer; those in Road District No. 6, comprising Civil Districts 16, 17 and 22, under R. R. Harper, and those in Road District No. 7, comprising Civil Districts 13, 18, 19 and 20, under R. S. Davis.

The Commissioners' Court of Pecos County, Tex., has ordered an election for Dec. 15 to vote on issuing $85,000 of highway bonds. It is planned to improve about 300 miles of road. Among the projected improvements is the construction of a highway from the eastern border of the county, at Sheffield, through Fort Stockton to the Brewster County line, a distance of 109 miles, forming a link in the proposed Borderland Route of a national highway between New York and San Francisco. According to present plans another road will be built between Fort Stockton and Buena Vista through the irrigated land district, connecting at the Pecos River with the "All Southern" route through San Angelo. Other plans contemplate the construction of a road south to Marathon on the line of the Southern Pacific Railroad and another northwest to the Reeves County line, connecting with the road from New Mexico through Pecos City. The system of roads will be built through the irrigated district surrounding Fort Stockton, comprising about 35 miles.

PHILADELPHIA'S HIGHWAY SYSTEM

(Photo Copyrighted 1911, by Wm. H. Rau, Philadelphia, Pa.)

BIRDSEYE VIEW OF THE NORTHERN SECTION OF PHILADELPHIA'S BUSINESS SECTION, LOOKING NORTH ALONG NORTH BROAD STREET—PHOTOGRAPH TAKEN FROM CITY HALL TOWER.

Philadelphia, the "City of Brotherly Love," is the largest city that has so far been selected by the American Road Builders' Association for the holding of one of its meetings. For this reason those attending the tenth annual convention of that organization at the First Regiment Armory at Broad and Callowhill Streets from next Tuesday to Friday, inclusive, will have an exceptional opportunity to examine modern pavements and to familiarize themselves with the administration of a particularly well organized highway department. In addition, the city is one which from its association with the great events of early American history and its present industrial and commercial importance has many points of interest.

The present city, which is coextensive with the county of the same name, is situated in the extreme southeastern part of Pennsylvania on the northwesterly bank of the Delaware River at the head of navigation. Bucks County adjoins it on the northeast, Montgomery County on the northwest and Delaware County on the southwest. Across the Delaware, to the southeast, are Burlington, Camden and Gloucester Counties in New Jersey. The waterfront on the Delaware is about 20 miles long and there are additional waterfronts on both banks of the Schuylkill River, which forms the southwestern boundary of the city for about four miles and then winds in a general southerly direction for about ten miles through the southern end of the city. The land within the corporate limits varies in elevation from the level of tidewater in the southern section to about 440 ft. in the northern portion. The area of the city is 129½ square miles.

Philadelphia was intended by William Penn and his associates to be "the great town" of the province (Pennsylvania) and its site was chosen and its street system planned with that end in view. The site at the junction of the Schuylkill and Delaware Rivers was selected because of the navigability of those streams, the beauty of the spot and other considerations, among which is said to have been the abundance of building stones and brick-making material.

How fully the hopes of the city's founders have been realized is attested by the industrial and commercial importance it has achieved. It is the third city in the United States in point of population, having about 1,650,000 inhabitants. It leads in the manufacture of hosiery and knit goods, carpets and rugs, fur-felt hats, locomotives, dye and finishing textiles, street railway cars, oilcloth and linoleum and saws, the value of the annual output of these manufactures being something over $100,000,000. In 1909 the output of its industries was valued at over $746,000,000 in the production of which over 250,000 wage earners were employed in 8,379 establishments at a total wage of $126,381,000. It is also an important port. An idea of its shipping may be gathered from the report of the Commissioners of Navigation for August, 1913, which showed imports to the value of $18,155,661 and exports amounting to $16,822,703.

The assessed valuation of all taxable property in the city is $1,556,323,614, of which $2,021,214 is personalty and the remainder, $1,554,302,400, is realty. Property is assessed at its actual value and the tax rate is $1.50 on each $100 of taxable property.

As previously noted the city of Philadelphia is unusually rich in historical interest. The first vessel moved by steam power was operated at Philadelphia in 1786 and in 1809 the first experimental railroad track laid in the United States was built near Bull's Head Tavern. The Philadelphia waterworks, said to be the first of its kind in the country, was commenced in 1799; the first public library was founded by Benjamin Franklin in 1731, and the first public pleasure ground laid out in America was dedicated in Philadelphia in 1681.

Among the places of historic interest in the city are Independence Hall, on Chestnut St., between 5th and 6th Sts.; Carpenters' Hall, situated off Chestnut St., between 3rd and

SOUTH BROAD STREET, PHILADELPHIA, PA.—LOOKING NORTH TOWARDS CITY HALL.

4th Sts.; The Betsy Ross House at 239 Arch St., and Christ Church, on Second St., above Market St. At Independence Hall, where the Second Continental Congress convened and the Declaration of Independence was signed, visitors may see the "Liberty Bell," many famous paintings and prints and a collection of relics of the Revolution. Carpenters' Hall was the meeting place of the First Continental Congress which convened in 1774. The Betsy Ross House is generally believed to have been the residence of Mrs. Elizabeth Ross, the seamstress who made there the first American flag. At Christ Church visitors can see the pew occupied by George Washington.

Among the other places of interest in Philadelphia are the City Hall, the largest building in the world devoted solely to municipal purposes; the United States Mint, established in 1792; League Island Navy Yard; the Frankford Arsenal; the University of Pennsylvania; Cramp's Shipyard; the Baldwin Locomotive Works, and Fairmount Park.

When Philadelphia was founded its street system was carefully laid out, the plan being to have the streets cross at right angles, or, in other words, follow the familiar "checkerboard" plan. The original east and west streets were nine in number and were given the names of various trees, while the 23 north and south streets were numbered from east to west. In the center of the city there was to be a square of 10 acres, each corner of which was to be reserved for public offices, and it was further planned that in each quarter of the city there should be another square 8 acres in extent to be used by the public.

In the present street system the old layout can readily be recognized. Broad St., with its suburban extension designated as York Road, passes through the center of the older part of the city, practically bisecting it, extending northerly from the League Island Navy Yard for about 12 miles. Market St. begins at the Delaware River, about 4 miles from the lower end of the city at League Island, crosses the old city between the Delaware and Schuylkill Rivers, crosses the latter and continues through West Philadelphia to the Delaware County line. Where Broad and Market Sts. intersect is the City Hall, occupying the 10-acre square referred to above. The east and west streets on either side of Market St. are named, while the north and south streets on either side of Broad St. are numbered beginning with 2nd St. near the Delaware River, Broad St., however, taking the place of 14th St. In general, the rectangular street system prevails throughout the city, although in some of the outlying portions the streets in the checkerboard layouts do not run north and south and east and west. The four 8-acre squares, though not located exactly as planned, were provided and the map of the present city shows very strikingly this arrangement in the location of Logan, Rittenhouse, Franklin and Washington Squares. In addition to these squares there are many parks in the city, the principal one being Fairmount

STREET IN ONE OF THE RESIDENTIAL SECTIONS OF PHILADELPHIA—ERIE AVENUE LOOKING EAST FROM NINETEENTH STREET.

Park, which is one of the largest in the world and has an area of over 3,400 acres. Including the four squares referred to and Fairmount Park, there are 97 parks and public squares in the city.

Public business in Philadelphia is administered through six ›vernmental divisions—the Department of Public Safety, the Department of Public Works, the Department of Public Health and Charities, the Department of Wharves, Docks and Ferries, the Department of Supplies, and the Department of City Transit. The departments are in charge of officials designated as directors and those of public safety and public works are subdivided into several bureaus, each of which is in charge of an official designated as the chief.

The Department of Public Works, which is in charge of Director Morris L. Cooke, is divided into five bureaus, as follows: Highways and Street Cleaning, Surveys, Gas and Lighting, Water, and City Property. The Department of Public Works, including the Bureau of Highways and Street Cleaning, which has jurisdiction over the construction, maintenance and cleaning of streets, the collection and disposal of garbage and the maintenance of bridges and sewers, has been thoroughly reorganized during the past year and a half. A chart showing substantially the present organization of the Bureau of Highways and Street Cleaning is reproduced on page 359.

The Chief of the Bureau is William H. Connell, who formerly held a similar position in the Borough of The Bronx, New York City. The Assistant Engineer in charge of plans, specifications, contracts and special work, is W. D. Uhler. The two Assistant Engineers of Construction and Maintenance are W. P. Taylor and J. B. McCord. The city is divided into districts, each of which is in charge of a district engineer and the principal difference in the chart and the actual present organization is in the number of districts and district engineers. At present there are seven districts instead of six as indicated.

As shown by the table giving the mileages of the different kinds of pavements in the city, sheet asphalt, granite block, vitrified block and wood block are the four modern pavements which are used the most. They are constructed, according to the standard specifications, as follows:

FIRST REGIMENT ARMORY, WHERE THE A. R. B. A. CONVENTION WILL BE HELD

Sheet asphalt pavement is laid upon a 6-in. concrete foundation composed of a concrete consisting of one part of Portland cement, three parts of coarse sand or gravel and six parts of hard crushed natural stone or gravel. On the concrete foundation is laid a binder course 1 in. in thickness after rolling and a wearing course 2 ins. thick after rolling. In sheet asphalt paved streets where there are street car tracks granite paving blocks are laid next to the tracks.

Granite block pavement is laid on a concrete foundation 6 ins. thick of the same character as that used for sheet asphalt. On the foundation is laid a sand cushion 2 ins. thick after the pavement has been rammed. The paving blocks are of granite, preferably having a crushing strength of over 16,000 lbs. per square inch. The blocks are from 8 to 12 ins. long, from 3½ to 4½ ins. wide on top and from 5 to

ANOTHER STREET IN A PHILADELPHIA RESIDENTIAL DISTRICT—ALLEGHENY AVENUE, LOOKING EAST FROM SIXTEENTH STREET.

5½ ins. deep. They are dressed so that after laying the joints shall not be more than ½ in. wide at the top and for a depth of 1 in. and not wider than 1 in. at any other part of the joint. It is also specified that the head of the block shall be so cut that it shall not have more than ⅜ in. depression from a straight edge laid across it in any direction and held parallel to its wearing surface. The blocks are laid vertically on edge, in close contact, at right angles to the curb except at intersections which are paved at an angle of 45 degrees to the lines of the intersecting roadways or as may be directed in individual cases. After laying the blocks gravel is spread over the surface and swept into the joints so as to fill them to a depth of about 2 ins. from the bottom. The blocks are then rammed and the joints filled with cement grout poured into the joints until it appears on the surface, the grout consisting of one part Portland cement and one part sand, together with sufficient water. After the grouting has set sufficiently so that a sand coating will not absorb moisture from the cement a layer of sand ½ in. in depth is spread over the surface and the pavement kept closed to traffic for at least seven days.

Vitrified block paving is laid upon a 6-in. concrete foundation, of the character previously described, the blocks being laid on a sand cushion 1½ ins. in thickness after rolling. The blocks used are the standard size, from 3 to 3½ ins. wide, 4 ins. deep and 8½ to 9½ ins. long. The pavement is laid with 1-in. expansion joints at the curb lines and filled with 1:1 cement grout.

Wood block pavement is laid upon a concrete foundation, of the character previously described and of such thickness as is specified for the particular case. The blocks are laid on a mortar cushion consisting of a layer not exceeding 1 in. in thickness of sand and cement, mixed dry in the proportion of one part of Portland cement to four parts of sand, and lightly sprinkled with water before the blocks are laid. The blocks are laid at right angles to the curb or as may be directed in any particular case, rolled and the joints filled with sand passing a 10-mesh sieve.

TABLE II—SHOWING NUMBER OF CONTRACTS, AMOUNT OF WORK IN PROGRESS, ETC.

Contracts, Jan. 1 to Dec. 1, 1913.

Character of work.	No. of contracts.	Miles.	Cost.
Grading	138	26.925	$680,169
Asphalt paving	98	10.710	510,205
Vitrified block paving	28	3.370	173,741
Granite	5	1.146	41,700
Asphalt repaving	27	3.053	102,100
Wood block repaving	29	2.206	131,900
Vitrified block repaving	19	2.790	123,000
Granite block repaving	9	1,457	100,300
Asphalt resurfacing	57	70.042	252,292
Vitrified block resurfacing	5	0.341	10,481
Water bound macadam resurfacing Bituminous macadam resurfacing	26	16.555	191,970
Water bound macadam surfacing	14	6.550	84,150
Northeast boulevard	1	5.500	1,000,000
South Broad St. boulevard (Southern Boulevard)	1	1.150	210,000
Asphalt repairs	3	....	330,805
Maintenance of bridges	5	....	46,490
Collection of garbage	1	....	229,300
Street cleaning	8	....	1,566,300
Miscellaneous contracts	11	....	46,204
Totals	[illegible]	88.795	$5,811,107

Macadam Repairing by Municipal Forces.

Macadam repairing and resurfacing, 274,877 sq. yds. of macadam roads put in first-class condition amounting to	27.00	$114,443.59
Total miles of all classes of street work completed and in progress to Oct. 15, 1913	115.795	

Other Work by Municipal Forces.

	Sq. Yds.	
Granite blocks repairs	453,763	179,217.63
Brick repairs	96,169	31,738.39
Granolithic repairs	2,961	3,104.42
Cobble and rubble repairs	3,189	1,092.82
Patching with tarvia	5,512	3,734.31
Bituminous surface treatments (20.68 miles)	.....	18,081.76
Cleaning, shaping up dirt roads, gutters, cleaning macadam roads, and sprinkling	.....	81,211.51
Miscellaneous work	.....	13,683.02
Asphalt repairs	14,887	11,940.64
Repairing and paving gutters	22,230	11,361.00
Repairs to bridges	.....	23,467.09
Repairs to sewers	.....	29,674.20
Total work by municipal forces	.....	$522,750.38
Grand total		$6,333,857.38

TABLE I.—SHOWING MILEAGE AND YARDAGE OF PAVEMENTS OF DIFFERENT KINDS IN PHILADELPHIA.

Kind of pavement.	Miles.	Square yards.
Granite block	352.99	6,653,532
Asphalt (sheet)	472.35	6,959,656
Asphalt (block)	7.49	72,532
Vitrified brick	163.63	2,376,224
Cobble	14.02	162,775
Rubble	6.69	93,182
Slag block	8.13	78,071
Cement and granolithic	11.08	54,242
Wood block	4.06	121,505
Totals of improved pavements	1,040.39	16,571,719
Macadam:		
Bituminous macadam road	29.01	312,104
Water bound macadam roads	261.31	3,035,429
Totals of macadam roads	290.32	3,347,533
Grand totals	1,330.71	19,919,252
Dirt roads	180.00	....

Redressed granite block paving is laid by taking up the old granite blocks, cutting them in two, redressing to the required dimensions (5 to 6 ins. in depth, 5 to 7 ins. in length and 3½ to 5 ins. in width) and relaying them with the cut end uppermost, then ramming and grouting the pavement with a Portland cement grout as previously described for granite block paving.

In the reorganization effected by Chief Connell, important changes have been made in the methods of maintenance. Formerly the only work performed by the city forces consisted of repairs to granite block and brick pavements and minor repair work on roads and drains. At present macadam roads are also taken care of by the city through an especially organized force which has been supplied with the requisite equipment for carrying on the work, and other work is similarly cared for as shown in table II. The removal of ashes and rubbish and the collection and disposal of garbage was also placed under the supervision of the several district engineers.

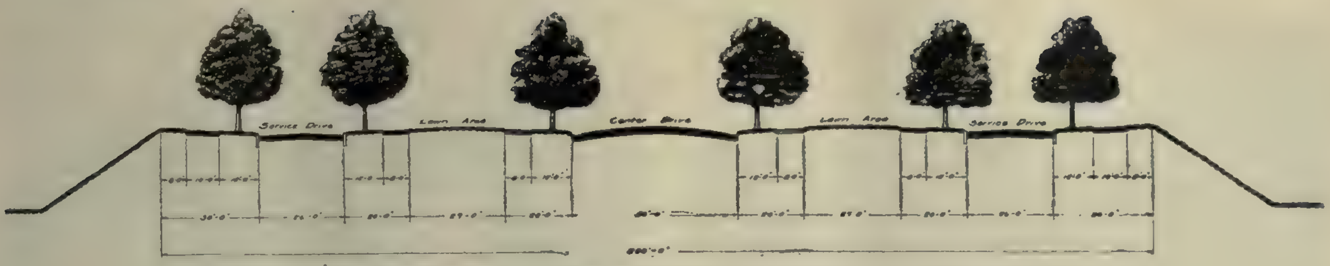
The money available for the maintenance and repair of macadam roads has been spent largely in reconstructing the heavily traveled main roads of this class with bituminous pavements; resurfacing with water bound macadam the less important roads, and on other roads making those repairs necessary for eliminating dangerous conditions. The work in 1912 and 1913 has been principally on the through routes connecting the city proper with the principal cities in adjoining states and with the through roads in adjacent Pennsylvania counties. During 1912, 23.96 miles of bituminous pavement of various types were built under contract and 21.39 miles of water bound macadam roads were resurfaced. The work of this character done during the present year is shown in table II.

In connection with the resurfacing work the series of "before and after" photographs reproduced in the illustrations on pages 360 and 361 is of interest.

An interesting piece of work done by the Bureau of Highways and Street Cleaning of Philadelphia is a service test roadway on the Byberry and Bensalem Turnpike in the extreme northern portion of the city. The roadway is over three miles long and consists of 26 sections, each of a different character. As its name implies, it is intended to furnish comparative tests of different kinds of pavements under service conditions. The several sections, briefly described, are as follows:

Section 1.—Sta. 0 + 00 to Sta. 37 + 00. Amiesite, 2 ins. thick, on a broken stone base.

Section 2.—Sta. 37 + 00 to Sta. 47 + 00, bituminous concrete,



A TYPICAL CROSS SECTION ON THE SOUTHERN BOULEVARD, PHILADELPHIA, PA.

Topeka specifications, 2 ins. thick, on a broken stone base; from Sta. 42 + 00 to Sta. 47 + 00 a seal coat of ⅛ gal. per sq. yd. of Pioneer Road Surface Apshalt was applied.

Section 3.—Sta. 47+00 to Sta. 50+00, 5-in. 1:3:6 concrete base, covered with a bituminous top of Pioneer Road Surface Asphalt and trap rock screenings.

Section 4.—Sta. 50+00 to Sta. 52+50, vitrified brick on a 4-in. concrete foundation.

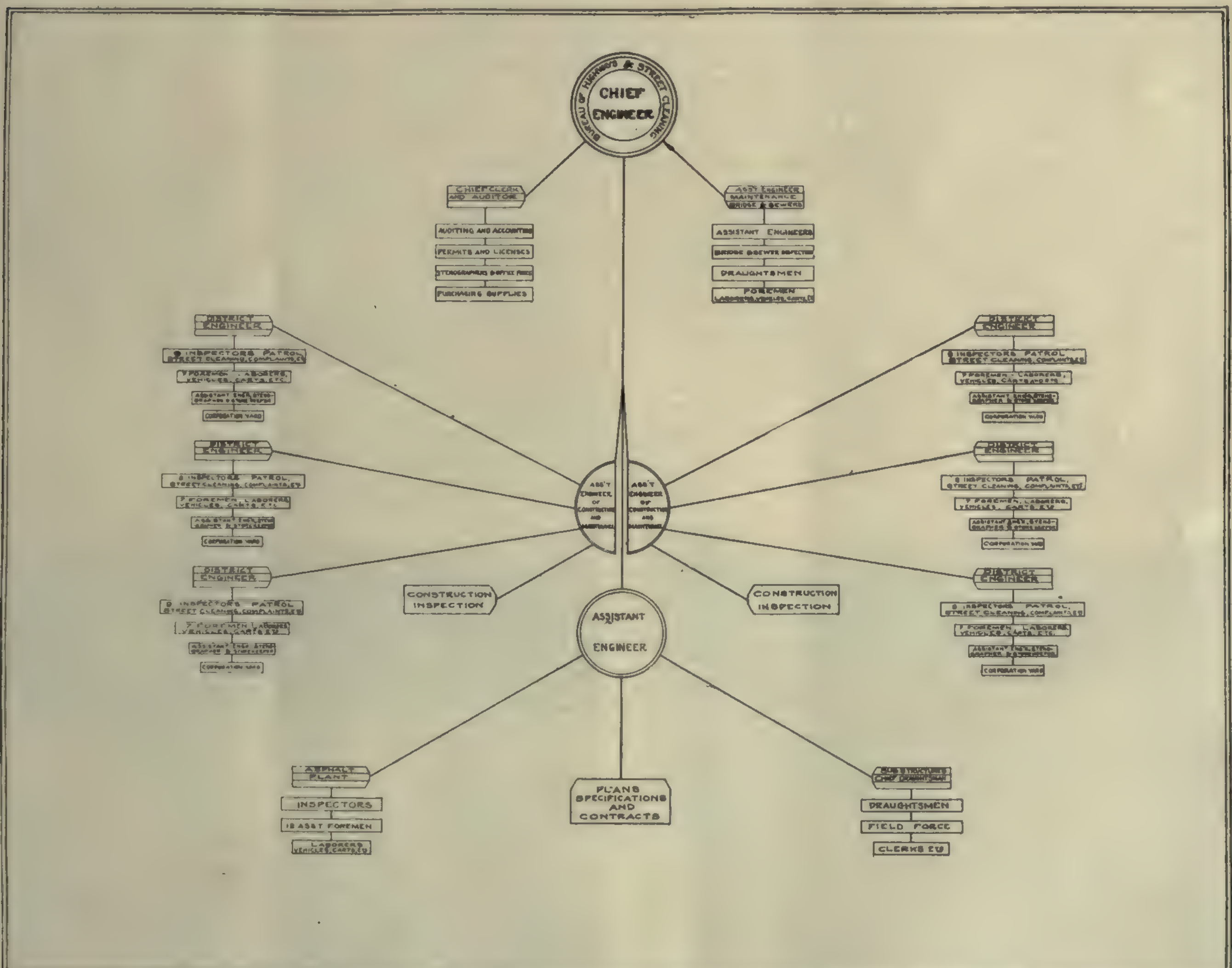
Section 5.—Sta. 52+50 to Sta. 59+50, 5-in. 1:3:6 concrete base, with ¼-in. asphaltic cement expansion joints at 40-ft. intervals. The section is divided into three divisions, each covered with a bituminous top. From Sta. 52+50 to Sta. 54+58 the bituminous top consists of Ugite "A," Ugite No. 3, trap rock chips, a second aplication of Ugite No. 3 and torpedo sand. From Sta. 54+58 to Sta. 57+17 the top consists of Tarvia B, Tarvia A and torpedo sand. From Sta. 57+17 to Sta. 59+50 the top consists of Texaco asphalt and trap rock chips.

Section 6.—Sta. 59+50 to Sta. 72+00, Filbertine, 2 ins. thick, on a broken stone base.

Section 7.—Sta. 72+00 to Sta. 84+50, bituminous concrete, 2 ins. thick, laid on a broken stone base. From Sta. 72+00 to Sta. 78+00 a seal coat was applied.

Section 8.—Sta. 84 + 50 to Sta. 87 + 50, vitrified brick on a 4-in. concrete foundation.

Section 9.—Sta. 87+50 to Sta. 94+00, 5-in. 1:3:6 concrete base with asphaltic cement expansion joints at 40-ft. intervals. The section is divided into four parts, each covered with a different bituminous top. From Sta. 87+50 to Sta. 90+00 the top consists of Dolarway bitumen and torpedo sand. From Sta. 90+00 to Sta. 90+70 the top consists of Bicomac and trap rock dust on half the section, and Bicomac


BUREAU OF HIGHWAYS & STREET CLEANING
CHIEF ENGINEER
CHIEF CLERK AND AUDITOR
AUDITING AND ACCOUNTING
PERMITS AND LICENSES
STENOGRAPHERS & OFFICE FORCE
PURCHASING SUPPLIES
ASS'T ENGINEER MAINTENANCE BRIDGE & SEWERS
ASSISTANT ENGINEERS
BRIDGE & SEWER INSPECTORS
DRAUGHTSMEN
FOREMEN LABORERS, VEHICLES, CARTS, ETC.
DISTRICT ENGINEER
9 INSPECTORS PATROL STREET CLEANING, COMPLAINTS, ETC.
7 FOREMEN, LABORERS, VEHICLES, CARTS, ETC.
CORPORATION YARD
DISTRICT ENGINEER
9 INSPECTORS PATROL, STREET CLEANING, COMPLAINTS, ETC.
7 FOREMEN, LABORERS, VEHICLES, CARTS, ETC.
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CORPORATION YARD
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9 INSPECTORS PATROL, STREET CLEANING, COMPLAINTS, ETC.
7 FOREMEN LABORERS VEHICLES, CARTS, ETC.
CORPORATION YARD
ASS'T ENGINEER OF CONSTRUCTION AND MAINTENANCE
ASS'T ENGINEER OF CONSTRUCTION AND MAINTENANCE
CONSTRUCTION INSPECTION
CONSTRUCTION INSPECTION
ASSISTANT ENGINEER
ASPHALT PLANT
INSPECTORS
18 ASS'T FOREMEN
LABORERS VEHICLES, CARTS, ETC.
PLANS SPECIFICATIONS AND CONTRACTS
DRAUGHTSMEN
FIELD FORCE
CLERKS ETC.

ORGANIZATION CHART OF THE PHILADELPHIA BUREAU OF HIGHWAYS AND STREET CLEANING.

RISING SUN LANE AT RICHMOND BRANCH OF P. AND R. RAILROAD—BEFORE RESURFACING.

RISING SUN LANE, PHILADELPHIA—AFTER RESURFACING WITH WATER BOUND MACADAM.

and trap rock chips on the other half. From Sta. 90+70 to Sta. 91+35, asphalt, cut back with naphtha, was spread and the naphtha burned out, after which trap rock chips were spread and rolled. From Sta. 91+35 to Sta. 92+00 the top consists of Bicomac asphalt of 100 penetration and trap rock chips.

Section 10.—Sta. 94 + 00 to Sta. 97 + 00, vitrified brick on a 4-in. concrete foundation.

Section 11.—Sta. 97+00 to Sta. 103+00, bituminous concrete, 2 ins. thick, with aggregate of crusher run trap rock on a broken stone base.

Section 12.—Sta. 103+00 to Sta. 109+00, bituminous concrete, 2 ins. thick, with an aggregate of bank gravel and sand, laid on a broken stone foundation.

Section 13.—Sta. 109+00 to Sta. 112+50, vitrified brick on a 4-in. concrete foundation.

Section 14.—Sta. 112+50 to Sta. 118+00, 5-in. Hassam pavement with bituminous top, consisting of tar, trap rock chips, asphaltic material and trap rock chips. The section was divided into three divisions, in each of which a different material was used for aggregate.

Section 15.—Sta. 118+00 to Sta. 121+00, vitrified brick on a 4-in. concrete foundation.

Section 16.—Sta. 121+00 to Sta. 127+00, resurfaced by penetration method, using Ugite binder.

Section 17.—Sta. 127+00 to Sta. 130+60, resurfaced by penetration method, using Byerlite asphalt.

Section 18.—Sta. 130+60 to Sta. 133+00, vitrified brick on a 4-in. concrete foundation.

Section 19.—Sta. 133 + 00 to Sta. 139 + 00, resurfaced by penetration method, using Tarvia X.

Section 20.—Sta. 139+00 to Sta. 145+00, resurfaced by penetration method, using Texas Road Surface Asphalt.

Section 21.—Sta. 145+00 to Sta. 151+00, resurfaced by penetration method, using Standard Binder B.

Section 22.—Sta. 151 + 00 to Sta. 157 + 00, resurfaced by the penetration method, using Pioneer Road Surface Asphalt, Binder B.

Section 23.—Sta. 157+00 to Sta. 163+00, resurfaced by penetration method using Bermudez Asphalt Binder B.

Section 24.—Sta. 163+00 to Sta. 169+00, resurfaced by the penetration method using Sun Hydrolene Asphalt Binder.

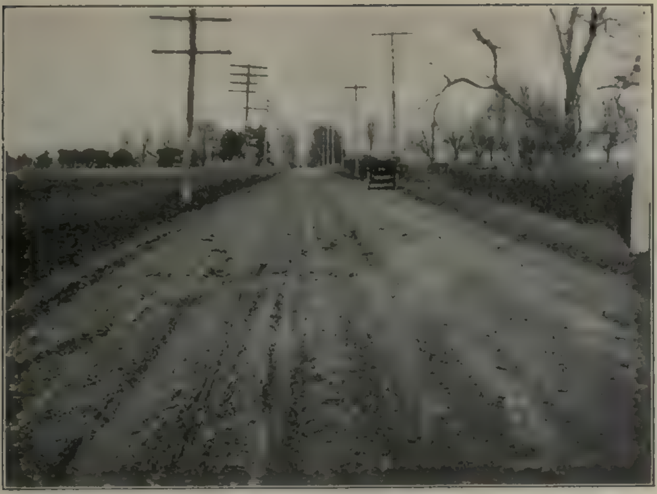
Section 25.—Sta. 169+00 to Sta. 174+50, Bicomac pavement consisting of a 4-in., 1:3:6 concrete base with wearing surface 1 in. thick after compression, applied cold and composed of 1 part Portland cement, 6 parts sand or crusher dust, 12 parts stone and 8 per cent. Headley Good Roads Co.'s No. 26.

Section 26.—Sta. 174+50 to Sta. 180+15, vitrified brick pavement on a 4-in. concrete foundation.

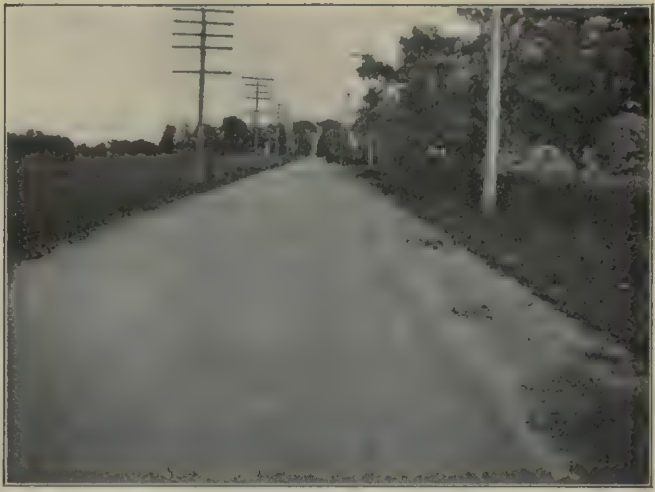
All the bituminous pavements built by the mixing method were laid on broken stone foundations. These were prepared by cleaning, spiking up and reshaping the old surface and then adding enough 1½-in. trap rock to bring it to the required contour and a thickness of not less than 4 ins. on top of the old foundation, after rolling. After rolling the first course, dry trap rock screenings were spread and rolled with as little water as possible until well bonded. This

SHEET ASPHALT ON A PORTION OF CLIFFORD STREET, PHILADELPHIA—BEFORE RESURFACING.

STREET SHOWN IN ILLUSTRATION OPPOSITE AFTER COMPLETION OF SHEET ASPHALT RESURFACING.



BYBERRY AND BENSALEM TURNPIKE NORTH FROM BUSTLETON TURNPIKE—BEFORE RESURFACING.



ROAD SHOWN IN ILLUSTRATION OPPOSITE—AFTER RESURFACING WITH WATER BOUND MACADAM.

course was filled not quite flush, leaving the coarse stones projecting slightly to furnish a better bond.

On all sections where bituminous broken stone pavements were laid by the penetration method (Sections 16, 17, 19, 20, 21, 22, 23 and 24), they were put on broken stone foundations prepared as were those for the mixed pavements, with the following exceptions: The 1½-in. stone was laid to a depth of not less than 3 ins. over the old foundation and after rolling was covered with trap rock screenings to fill the voids. After rolling this dry, sprinkling with water and again rolling, a course of trap rock passing a 2⅜-in. screen and retained on a ¾-in. screen was applied and rolled to a depth of 3 ins. On this the bituminous binder specified was spread at a rate of not less than 1¼ nor more than 1½ gals. per sq. yd., and on it enough ¾-in. dry trap rock was spread to just fill the voids and cover the surface. After this the road was thoroughly rolled until the surface was bonded, the surface swept and from 1-3 to ½ gal. per sq. yd. of bituminous binder was applied. This was covered with a thin layer of dry trap rock chips and rolled.

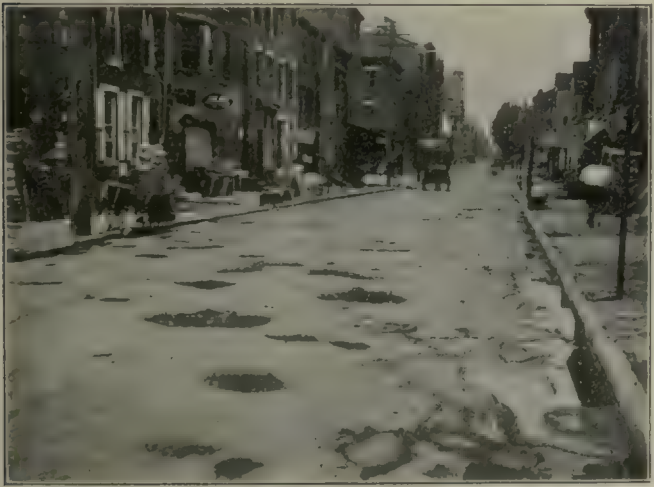
Important and interesting work in the southern portion of the city comprises the development of League Island Park, the Southern Plaza and the Southern Boulevard. League Island Park is approximately a half square mile in area and is situated in the southern portion of the city just north of League Island. Plans for the work have been revised by Olmsted Bros. and bids will be advertised for in the near future. About $500,000 is available for this work.

The Southern Boulevard consists of that part of South Broad St. lying between League Island and Oregon Ave., the northern boundary of the Plaza. It lies south of the built-up districts of the city and though work was commenced some time ago it was suspended pending negotiations with the Pennsylvania and Baltimore and Ohio railroads regarding grade crossings. Work was resumed this fall, a contract being awarded to the Hassam Paving Co. for the construction of the boulevard from Oregon Ave. to a point 1,650 ft. south of Pattison Ave. The present contract calls for the expenditure of about $210,000.

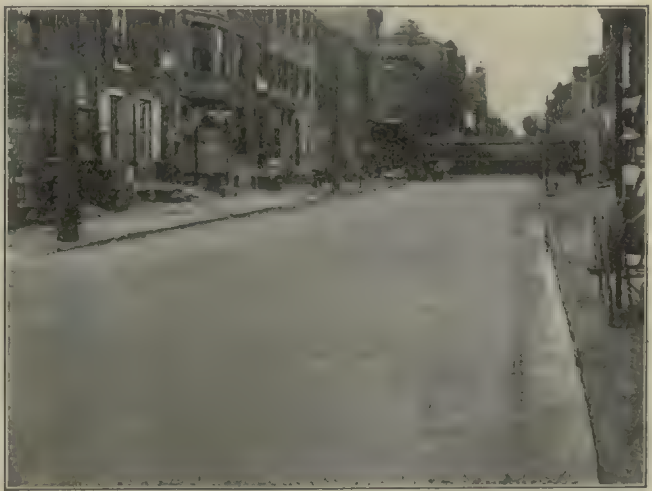
A typical cross section of the Southern Boulevard is reproduced on page 359. The center and service drives will be of bituminous macadam on a 5-in. concrete foundation.

The Plaza, which covers four city blocks, extends north from Bigler St. to Oregon Ave. and east and west between 13th and 15th Sts. The design for its improvement, as prepared by the landscape architects, Olmsted Bros., provided for the formal treatment of the central area of about four acres and the informal treatment of the surrounding area, about thirteen acres in extent. New plans have recently been prepared and work is to be commenced next spring.

Another important piece of work, undertaken during the present year is the completion of the Northeast Boulevard. The boulevard commences at the intersection of Broad and Cayuga Sts. and extends about 7 miles to Solly St., where it will be divided into three branches. The western branch will extend toward Bustleton to connect with the direct road



ASPHALT PAVEMENT ON PART OF FITZWATER STREET, PHILADELPHIA—BEFORE RESURFACING.



STREET SHOWN IN ILLUSTRATION OPPOSITE—AFTER RESURFACING WITH SHEET ASPHALT.

to Trenton and New York; the central branch is planned to run northeasterly and to be used as a secondary road to Bristol and Trenton, and the easterly branch is to continue to Torresdale.

Previous to 1913 the work had been completed from Broad St. to 2nd St., a distance of about 1½ miles, and early in 1913 a contract was awarded for the section between 2nd St. and Rhawn St., a distance of approximately 5½ miles. The boulevard will be similar to the Southern Boulevard, except that the center drive will be 60 ft. wide from out to out of ditches, each of the service drives will be 34 ft. wide, and the lawn areas between the center drive and the service drives will be 56 ft. wide each and have no walks. The three drives will be paved with bituminous macadam. The work is now in progress under a contract amounting to about $1,000,000 and is about half completed.

Highway Engineering Courses at Columbia University.

Announcements have recently been made outlining the work to be undertaken in the graduate highway engineering course at Columbia University, New York City, during the coming academic year. The course will be similar to that of last year, which was described at length in the issue of December 7, 1912. Work began on Wednesday of the present week and will continue until March.

A departure from the usual method of conducting the work has been made this year, in providing three supplemental courses for the benefit of those desiring to avail themselves of the instruction offered by the university but who are unable to devote the time necessary for taking the full course.

The first of these supplemental courses is a one-month course in highway engineering. It will be given between Dec. 19, 1913, and Jan. 23, 1914, and will comprise three subdivisions of the general course, as follows:

Chemistry H-199: Mining, manufacture, testing and inspection of bituminous materials. Lectures, demonstrations, seminars and inspection of refineries. Dec. 19 to Jan. 3. 9:00 a. m. to 4:00 p. m., Mon., Tues., Wed., Thur., Fri., Sat. Mr. Prevost Hubbard.

Highway Engineering 102: Broken stone, gravel and other roads; brick, stone block, wood block and cement concrete pavements. Lectures, inspection trips and reports. Jan. 5 to Jan. 21. 2:00 to 4:30 p. m., Mon., Tues., Wed., Thur.; 4:00 to 6:00 p. m., Fri. Professor Arthur H. Blanchard.

Highway Engineering 103: Construction and maintenance of all types of bituminous surfaces and bituminous pavements. Lectures, inspection trips and reports. Jan. 5 to Jan. 23. 8:00 to 10:30 p. m., Mon., Tues., Wed., Thur., Fri. Professor Arthur H. Blanchard.

The second will be a seven-week course in the chemistry and use of bituminous materials in highway engineering. It will be given between Dec. 19, 1913, and Feb. 3, 1914, and will comprise the following subdivisions of the general course:

Chemistry H-199 (as in one-month course).

Highway Engineering 103 (as in one-month course).

Chemistry H-200: Laboratory course covering the determination of the chemical and physical properties of all types of bituminous materials used in highway engineering. Drafting of specifications for bituminous materials used in the construction and maintenance of various types of bituminous surfaces and bituminous pavements. Essentials of inspection of bituminous materials at plant, laboratory and highway. Jan. 21 to Feb. 3. 9:00 a. m. to 4:00 p. m., Mon., Tues., Wed., Thur., Fri., Sat. Mr. Prevost Hubbard.

The third course will be an eleven-week course in highway engineering, covering, in addition to those subjects covered in the two previously mentioned courses, structural geology, soils and rocks, laboratory work in the testing of non-bituminous road materials, mechanical appliances and management engineering. It will be given between Dec. 19, 1913, and March 4, 1914, and will comprise seven of the subdivisions of the regular course, as follows:

Chemistry H-199: Mining, manufacture, testing and inspection of bituminous materials. Dec. 19 to Jan. 3. Mr. Prevost Hubbard.

Highway Engineering 102: Broken stone, gravel and other roads; brick, stone block, wood block and cement concrete pavements. Jan. 5 to Jan. 21. Professor Arthur H. Blanchard.

Highway Engineering 103: Construction and maintenance of all types of bituminous surfaces and bituminous pavements. Jan. 5 to Jan. 23. Professor Arthur H. Blanchard.

Geology H-215: Topographical and structural geology. Soils and rocks. Jan. 21 to Feb. 3. Professors James F. Kemp and Charles P. Berkey.

Highway Engineering 107: Mechanical appliances used in highway engineering. Feb. 4 to Feb. 19. Mr. Henry B. Drowne.

Highway Engineering 108: Laboratory course in the testing of all non-bituminous road and paving materials. Feb. 4 to Feb. 23. Mr. Henry B. Drowne.

Highway Engineering 106: Management engineering as applied to highway engineering. Feb. 24 to March 4. Mr. Henry B. Drowne.

Besides the announcement of these courses, announcements have also been made concerning the Davis Library of Highway Engineering and the schedule of public lectures during the month of December. The announcement concerning the library calls attention to its nature and invites highway officials, engineers, chemists, contractors and others interested in highway engineering to make use of it for reference. The library is located in rooms 407 and 410 of the Engineering Building and is open from 9 a. m. to 5 p. m. on all week days except Saturdays and holidays and on Saturdays from 9 a. m. to 12 m. Between Dec. 1 and April 1 it is also open from 7:30 to 10:30 p. m. on all week days except Saturdays and holidays and from 2 to 6 p. m. on Saturdays.

The schedule of lectures for December, 1913, which, as usual, will be given at 8:30 p. m. in Room 402 of the Engineering Building, is as follows:

Dec. 13—"Economics of Highway Engineering in the Middle West," by Arthur N. Johnson, State Highway Engineer of Illinois.

Dec. 15—"Highways of the Northwest," by Samuel Hill, of Seattle, Wash., President of the American Road Builders' Association.

Dec. 23—"The Manufacture of Refined Water Gas Tar," by Walter H. Fulweiler, Chief Chemist, United Gas Improvement Co., Philadelphia, Pa.

Dec. 27—"The Manufacture of Refined Coal Tar," by Philip P. Sharples, Chief Chemist, Barrett Mfg. Co., Boston, Mass.

Road Repairs in the Kingdom of Poland are to be undertaken on a large scale, according to a note in a recent issue of the "Daily Consular and Trade Reports." Repeated complaints of the condition of the roads have been made, and the Chief of the Warsaw Circuit Land and Water Communication Office has obtained a credit of $25,000 from the Ministry of Communications for the preparation of plans for road improvement. It is estimated that over $1,500,000 will be required for the repair of the first and second-class roads of the kingdom. Work has already commenced and is being done by the commission as no contractors submitted bids. Work is under way on the Krakau Road between Warsaw and Radom, on the road between Brzesc and Lublin, on the Kielce Road and on the Kalisz Road, and upon second-class roads connecting with those rated as first-class.

The special local road tax law passed by the Texas Legislature at its last session allows the residents of any designated area, whether a political unit or not, to vote upon themselves a tax with which to improve their roads. Heretofore elections of this kind could be called only for an entire county, or latterly, for an entire commissioner's precinct. The first election to be held under the new act has been authorized by the commissioners' court of Travis County for Dec. 18, to provide funds for road improvement in the second justice precinct. The proposed special tax will be 15 cts. on the $100 of taxable values. Wilson County has also ordered a similar election for the same ratio of taxation, to be held on Feb. 10. A number of communities are planning to vote for highway improvement under the new law and are petitioning the county commissioners' courts for such elections.

PENNSYLVANIA HIGHWAY WORK

AN IMPROVED PENNSYLVANIA HIGHWAY—VICKSBURG, UNION COUNTY, PA.—PAVED IN 1912 WITH ASPHALTIC CONCRETE (WARRENITE) ON A CONCRETE FOUNDATION.

State participation in road building in Pennsylvania was first provided for by an act of the General Assembly which was approved on April 15, 1903. This law was reenacted, with amendments, at the next session of the Legislature and was approved May 1, 1905.

Although not adopting the state aid principle until more than a decade after its first application, Pennsylvania has been the scene of some of the most famous events in the history of road building. Between 1792 and 1794 the first stone turnpike built in the United States was constructed between Philadelphia and Lancaster by a private company. This was called the Lancaster Turnpike and was the first of the privately owned improved roads that later became so common. The Lancaster Turnpike formed the eastern section of an historic thoroughfare known as the Forbes Road. This road extended westward from Philadelphia through Lancaster, Carlisle, Shippensburg, Bedford, Ligonier and Greensburg to Pittsburgh, and during the early days of the country was an important channel of communication between the East and the territory then considered as the West. Different names were given to its various sections from time to time and its history is full of interest.

In order to understand the road problem in Pennsylvania it is necessary to have in mind the factors which governed the development of the existing system and those which now enter into the problem of supplying the state with a system adequate for the demands of modern traffic.

Pennsylvania was granted to William Penn by Charles II. of England in payment of a debt of £16,000, the charter describing the province as the land bounded on the east by the Delaware River, extending west five degrees of longitude, bounded on the north by "the beginning of the three and fortieth parallel of northern latitude" and on the south by "the beginning of the fortieth degree of northern latitude." It was first settled largely by Quakers. Until about 1700 the majority of the settlers were English, Welsh and Irish, but from that time on most of them came from other races, the Germans coming during the period from early in the eighteenth century to the outbreak of the Revolution.

The westward movement of population through the state early created a demand for roads and from this came the Forbes Road already mentioned and many other historic routes, among them the Old National Road and the many turnpikes. These latter were built chiefly between 1800 and 1830, and were very important factors in the inland commerce of the state down to the middle of the nineteenth century. The construction of canals, which commenced about 1830, and the advent of the railroad operated to divert traffic from the highways in Pennsylvania as in other parts of the country. There are few readily available records of road work during the years intervening between the era of the turnpikes and the establishment of the state highway department since during that period the work was a local matter.

The state of Pennsylvania, as it exists at present, is about 300 miles in extreme width (east and west) and about 180 miles in its greatest north and south dimension. It has a gross area of 45,215 square miles, of which 44,985 square miles are land area. The Allegheny Mountains extend nearly across the state in a general northeasterly direction from near the center of the state's southern boundary, dividing it roughly into two parts. These mountains and the hills, in which the Appalachian system terminates within the state, cover approximately one-fourth of its area. It is traversed by many large rivers, and, as previously noted, is bounded on the east by the Delaware River. The principal tributaries of the Delaware are the Schuylkill and the Lehigh, the former joining it at Philadelphia and the latter at Easton. The eastern portion of the state is also traversed by the Susquehanna River with its branches and tributaries, of which the Juniata is the largest. The principal rivers in the western portion are the Ohio, formed by the confluence of the Monongahela and the Allegheny; the Youghiogheny; the Big Beaver, and the Kiskimmitas.

In 1690 the population of Pennsylvania was 12,000. According to the 1910 census its inhabitants numbered 7,665,111, and it ranked second among the states of the Union. The state is very rich in natural resources, the value of the output for the year of 1911 having been $1,000,898,597, the principal product being coal. Among the items making up the total those of especial interest to road builders are as follows: Brick and tile, $18,402,739; Portland cement, $21,966,402 ; sand and gravel, $2,322413; stone (including paving and curbing stone), $8,431,512; trap rock, $3,485,116.

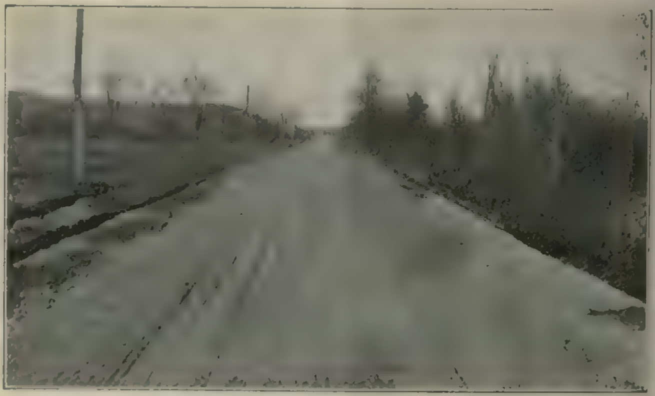
Placing the Concrete Foundation.

Finished Subgrade and Concrete Curb.

Finished Concrete Foundation and Curb.

Laying the Brick Paving Blocks.

Pavement Before Rolling and Filling.



Completed Pavement Covered with Sand.

THE CONSTRUCTION OF A BRICK PAVEMENT UNDER PENNSYLVANIA STATE HIGHWAY DEPARTMENT SPECIFICATIONS—VIEWS DURING BUILDING OF A ROAD IN SUGAR CREEK TOWNSHIP, VENANGO COUNTY, PA.

Previous to the passage of the law of 1903 which established a state highway department the demand for better roads had become insistent and by the terms of a law passed in 1895 county commissioners were authorized to provide for the systematic improvement of township roads and to issue bonds to pay for the work. As a result of this, several counties undertook the betterment of their highways and in some instances considerable progress was made.

The law of 1903 provided for the establishment of a state highway department in charge of a state highway commissioner and an assistant state highway commissioner. Joseph W. Hunter was appointed to the former office and held it until June 1, 1911. The assistant state highway commissioner was George Statler. The law was amended in 1905, and the department reorganized, Mr. Hunter remaining State Highway Commissioner.

The 1905 amendment repealed the 1903 law providing for an assistant state highway commissioner, and, although it provided for a corresponding office, no appointment was made until late in 1906 when R. D. Beman was made Assistant State Highway Commissioner. In July, 1907, Mr. Beman was made Deputy State Highway Commissioner, and was succeeded as Assistant State Highway Commissioner by G. W. Ensign. Messrs. Hunter, Beman and Ensign served as Commissioner, Deputy Commissioner and Assistant Commissioner, respectively, until the passing of the 1911 law.

Between June 1, 1903, and May 31, 1911, the total amount appropriated for reconstruction work was $9,500,000. Of this amount 90 per cent. was apportioned to the several counties of the state (excepting Philadelphia County, which corresponds in area to the city of Philadelphia) in proportion to the number of miles of township roads in each county. The remaining 10 per cent. was set aside as a maintenance fund for distribution to the townships and counties having improved roads, in proportion to the number of miles of such roads in each.

Preparing Subgrade, Jefferson County.

Laying Telford—Jefferson County.

Finished Telford—Mercer County.

Macadam in Place—Jefferson County.

Pouring First Application—Jefferson County.

Applying Seal Coat and Screenings—Jefferson County.

THE CONSTRUCTION OF A BITUMINOUS MACADAM ROAD (PENETRATION METHOD)—VIEWS DURING CONSTRUCTION OF SPROUL ROUTE 63, JEFFERSON COUNTY, AND A STATE AID ROAD IN MERCER COUNTY, PA.

Under the law the initiative for the construction of a township road had to be taken by the board of supervisors of the township in which the road was situated. The township board could make application either to the county commissioners or to the state department. In the former case, if the county board joined with the township board in petitioning for the improvement, the township and the county each paid 12½ per cent. of the cost of the work and the state paid the remaining 75 per cent. If the application came direct to the state from the township board the township paid 25 per cent. of the cost, the state paying the remaining 75 per cent, as by the other method. All surveys and plans were made by the department and the contracts were made by the State Highway Commissioner. The state paid 75 per cent. of the cost of reconstruction, as noted; all the costs of administration, and a portion, not exceeding 75 per cent., of the cost of maintaining improved roads.

Operating under these laws the state extended aid in the reconstruction of about 850 miles of road at a total cost of approximately $9,000,000. This expenditure included the cost of grading, draining, constructing the foundation and wearing surface, building bridges, engineering and inspection and the payment of damages. Engineering and inspection amounted to 1.95 per cent. and 2.87 per cent., respectively, of the entire cost of the work. In addition to extending aid for the construction and reconstruction of roads the state

OLD WOODEN TRUSS BRIDGE ON A ROAD IN RICHLAND TOWNSHIP, CLARION COUNTY, PA.

PLATE GIRDER BRIDGE REPLACING WOODEN STRUCTURE SHOWN IN ILLUSTRATION OPPOSITE.

contributed a part of the cost of maintenance not exceeding 75 per cent. of the average annual cost for something over 2,000 miles of road which had been reconstructed by the counties and townships without state aid.

Under the law of 1905, as amended in 1909, the highway department was given the oversight of approximately 88,000 miles of unimproved roads in that the township officials were obliged to make reports to the State Highway Department annually. These reports were used as a basis for the distribution of the appropriation made to townships of the second class maintaining the cash road tax system. Each such township was entitled to receive an annual allotment from the state equal to 50 per cent. of the amount of the road tax collected in the township provided that no township received over $20 annually for each mile of township road.

The work done under the highway law previous to 1911 resulted in the construction of what might be termed a patchwork system of improved roads since the longest continuous stretch of road improved under the law was only about 15 miles long. The work, however, provided, as noted, a considerable mileage of improved roads, and served as an object lesson to the local communities and also resulted in arousing the local officials to greater efforts in road improvement and in shaping public sentiment for road betterment.

The General Assembly of 1911 enacted a bill known as the Sproul bill. This, and subsequent legislation amending and supplementing it, make up the highway laws under which the State Highway Department now operates. A complete abstract of the Sproul bill was published in "Good Roads" for Aug. 5, 1911, page 78.

The bill provides for the appointment by the Governor of a State Highway Commissioner at a salary of $8,000 a year; a First Deputy State Highway Commissioner at $6,000; a Second Deputy State Highway Commissioner at $6,000; a Chief Engineer at $7,000, and an Auditor at $3,000. It also provides for the appointment by the State Highway Commissioner of the following: An Engineer of Bridges at $3,600, fifty superintendents of highways at $1,500 each, a Chief Draftsman at $2,400, and a Chief Clerk at $2,400. The State Highway Commissioner may also appoint, as the work of the department requires, the following: Fifteen assistant engineers at $2,400 each, four assistant draftsmen at $1,800 each, four clerks and four stenographers at $1,200 each, two bookkeepers at $1,600 each, and, from time to time, such additional clerks and stenographers at not over $1,000, as may be required. One of the deputies, the chief engineer, the engineer of bridges, the assistant engineer, the chief draftsman and the assistant draftsmen must be civil engineers, and the superintendents of highways must be "experienced in the construction and maintenance of improved roads."

The present personnel of the department is as follows:

Commissioner, Edward M. Bigelow.

First Deputy, Joseph W. Hunter; Second Deputy, E. A. Jones.

Chief Engineer, S. D. Foster.

Auditor, W. R. Main.

Statistician, W. R. D. Hall.

LARRY'S CREEK ROAD, MIFFLIN TOWNSHIP, PA.—PHOTOGRAPH TAKEN IN 1910 BEFORE IMPROVEMENT.

LARRY'S CREEK ROAD—PHOTOGRAPH TAKEN IN 1911, AFTER IMPROVEMENT—BITUMINOUS MACADAM.

ANOTHER VIEW OF THE PLATE GIRDER BRIDGE SHOWN IN THE ILLUSTRATION AT THE LEFT.

A CONCRETE CULVERT BUILT BY STATE AID IN EAST LACKAWANNOCK TOWNSHIP, MERCER COUNTY, PA.

Superintendent of Road Signs, G. A. Barclay.

Automobile Division Registrar, T. C. Boyd.

Chief Clerk, L. F. Neefe.

Assistant Engineers: P. M. Tebbs and A. W. Burke.

Experimental Department, T. J. Keane.

Maintenance Engineer, G. H. Biles; Assistant Maintenance Engineer, J. T. Gephart.

Engineer of Bridges, W. Whited.

Chief Draftsman, G. H. Elsenhans.

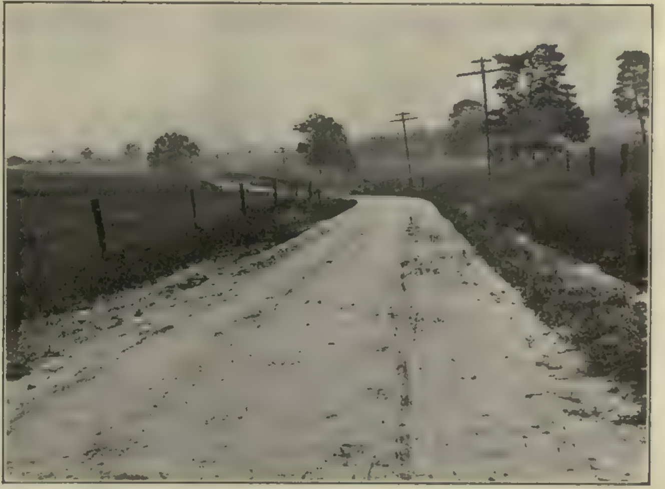
Assistant Engineers: District No. 1, W. D. Meyers; District No. 2, A. B. Gray; District No. 3, A. S. Clay; District No. 4, H. W. Claybaugh; District No. 5, G. C. Langenheim; District No. 6, E. S. Frey; District No. 7, W. F. Cressman; District No. 9, C. W. Hardt; District No. 10, S. W. Jackson; District No. 11, C. S. Lemon; District No. 12, J. I. Riegel; District No. 13, L. L. Robbins (Acting Assistant Engineer); District No. 14, O. K. Taylor; District No. 15, W. A. Wynn.

The Sproul bill provided that certain roads having a total length of about 9,000 miles and included in 296 routes designated in the bill should be taken over by the state for improvement as state highways at the expense of the commonwealth. In carrying out improvements the State Highway Commissioner, with the approval of the Governor, may relocate roads forming a part of the prescribed state highway system when the route is dangerous or inconvenient or when such relocation would materially reduce the expense of improvement. In case a state highway includes a toll road or any other road owned or controlled by a private corporation, such road may be purchased by the state or, if necessary, secured by condemnation and the payment of damages and the costs of the action. The State Highway Commissioner is also empowered to take over highways in boroughs and incorporated towns under certain conditions.

It is stipulated that the work of improving the state highways shall be carried on "as equally and uniformly in the several counties as conditions will allow." All construction and reconstruction work has to be done by contract awarded by the State Highway Department and in accordance with plans and specifications prepared by the department. The law provides further that all roads built or rebuilt "shall be macadam, telford, or other stone road, or constructed of brick, gravel, cinder, oyster shells or other good materials, or combination of materials, in such manner that the same, of whatever material constructed, will, with reasonable repairs thereto, at all seasons of the year, be firm, smooth and convenient for travel." The determination of the kind of roadway or pavement to be built is left to the State Highway Commissioner, but it is specified that all state highways shall be improved to a width of not less than 12 ft.

Roads improved as state highways are maintained by the State Highway Department at the expense of the state, except that in the case of highways within boroughs or incorporated towns 50 per cent. of the cost of maintenance is paid by the borough or incorporated town under certain conditions. The State Highway Commissioner may make contracts with any person, firm or corporation or with the authorities of boroughs, incorporated towns, townships or counties for the maintenance of state highways. He may also

A ROAD IN SOUTH BUFFALO TOWNSHIP, ARMSTRONG COUNTY, PA.—BEFORE IMPROVEMENT.



ROAD SHOWN IN ILLUSTRATION OPPOSITE—AFTER CONSTRUCTION OF BRICK PAVEMENT.

employ labor and purchase equipment and supplies for the prosecution of maintenance work—or the work of construction or reconstruction—on state highways.

Among other provisions of the law relating to state highways are those in regard to signs, trees, railway tracks and rules for the use of the roads. The law directs that on state highways there shall be erected signs bearing the words "State Highway," and the year in which the road was improved by the state and that at intersecting roads, signs shall be erected giving directions to towns and villages. Trees are to be planted and maintained along state highways, and the State Highway Commissioner is empowered to make "reasonable rules and regulations governing the use of all state highways." Except under such conditions as are prescribed by the State Highway Department, no railroad or street railway may be built on a state highway, nor may any railroad or street railway crossing, any gas or water pipe, any electric conduit, or other piping be laid upon or in any state highway, nor may any telephone, telegraph, electric light or power poles be erected upon any part of a state highway.

Besides providing for the construction, reconstruction and maintenance of state highways, the Sproul law provides for the extension of aid by the state in the improvement and maintenance of certain roads. Such assistance is given to counties and townships for the improvement of any roads not included in the system of state highways and consists of the payment by the state of not more than 50 per cent. of the total cost of improvement and subsequent maintenance. When a township and a county make joint application for aid each pays 25 per cent. of the cost of improvement and the township pays 50 per cent. of the entire maintenance cost, except that in such a case the county and the township may agree to bear their 50 per cent. of the cost of the improvement in a different proportion. When a county alone or a township alone applies for aid the county or township making application pays 50 per cent. of the cost of improvement and 50 per cent. of the cost of the subsequent maintenance. A county or a township desiring state aid must levy a cash road tax to meet the expense of improvement and after the improvement has been made must levy an annual cash road tax sufficient to pay for its share of the maintenance costs. Bonds may be issued by counties or townships to secure funds for improvements or maintenance.

Petitions for the improvement of highways may originate with county or township authorities or with the owners of the majority of the assessed valuation of real estate in any township. The township officials may petition the State Highway Department through the county commissioners or they may send their petition directly to the department. Petitions from property owners are made first to the township officials who are then required to petition the county commissioners whose duty is then the same as when the petition originates with the township officials.

State aid extended to townships and counties is apportioned among the several counties of the state in accordance with the mileage of township and county roads in the counties. The maintenance and repair of the roads improved as state aid highways are attended to by the State Highway Department, 50 per cent. of the cost being paid back by the townships in which the roads are situated or by the counties in cases where the roads have been improved without the cooperation of the townships. As in the case of state highways the state may, under certain conditions, bear a portion of the expense of improving roads within boroughs or incorporated towns.

The Sproul bill appropriated $3,000,000 for the maintenance, repair and construction of state highways and for the payment of the state's share of the maintenance and repair of state aid highways. It also appropriated $1,000,000 to be applied to state aid in the improvement of the roads designated in the bill as state aid highways. Another section of the bill provided that any money in the treasury to the credit of the State Highway Department for the improvement and maintenance of state or state aid highways should remain there for the use of the department until used for the purposes for which it was appropriated.

The work of the Pennsylvania Highway Department will be somewhat amplified during the coming season by an act passed at the last session of the General Assembly which went into effect on Monday of the present week. This act provides for the establishment of a Bureau of Township Highways in charge of one of the deputy state highway commissioners. By its provisions the Deputy Highway Commissioner in charge of the bureau is given general supervision over all township and highway bridges improved or maintained, wholly or in part, by state aid except as otherwise provided for. The bill also provides for the division of the state into suitable districts, to each of which is to be assigned one of the superintendents of highways provided for in the Sproul bill. These officers are to have general charge of the township highways within their respective districts under the Deputy Highway Commissioner in charge of the bureau. The law provides for the administration of township highways and bridges by the local officials and prescribes the levying by them of cash road taxes not exceeding 10 mills on each dollar of valuation. It also provides that each township acting under the provisions of the act shall receive from the state an annual grant equal to 50 per cent. of the total amount of the road tax collected in the town with the provision that in any one year no township shall receive more than $20 for each mile of township road in it. Authority to issue bonds is also conferred upon the township supervisors. Work done by state aid in the towns is to be carried out in accordance with rules and regulations prescribed by the State Highway Commissioner, and in case towns refuse to abide by these rules the State Highway Commissioner may withhold state aid from them. The State Highway Commissioner is also given authority to determine where and how money levied, collected or received from the state as state aid under the terms of the act shall be expended.

In 1911 the Legislature passed an amendment to the constitution to enable the state to issue bonds for road improvement to the amount of $50,000,000. In accordance with the law, this was passed again by the 1913 Legislature and was then brought before the people for ratification at the elections in November of this year. It was defeated by a majority of 40,000, and, according to the constitution, can not come up again for a period of five years.

TABLE I—PENNSYLVANIA STATE HIGHWAYS CONSTRUCTED OR FOR WHICH CONTRACTS HAVE BEEN AWARDED FROM JUNE 1, 1911, TO OCTOBER 30, 1913.

	Length Miles	Total Cost
Water bound macadam	86.23	$717,401.95
Asphaltic macadam	48.79	759,820.86
Asphaltic concrete	41.17	885,698.42
Brick	8.94	232,477.12
Cement concrete	2.71	50,718.62

TABLE II—PENNSYLVANIA STATE AID HIGHWAYS CONSTRUCTED OR FOR WHICH CONTRACTS HAVE BEEN AWARDED FROM JUNE 1, 1911, TO OCTOBER 30, 1913.

	Length Miles	Total Cost
Water bound macadam on telford	16.07	$147,019.37
Asphaltic macadam	46.42	777,122.35
Asphaltic concrete	8.90	204,767.76
Brick	20.36	478,704.62
Cement concrete	0.45	7,404.00

The work done on state highways and state aid highways under the provisions of the 1911 law are shown in tables I and II. In table I it should be noted that the water bound macadam work includes maintenance contracts where the foundation is partially rebuilt and the brick work includes some construction in boroughs where the pavement is of extra width.

There are about 95,000 miles of road in the state of Pennsylvania, of which 9,564.7 miles are state highways. Previous to June, 1911, 822 miles of state highway had been improved, and since June, 1911, 186.8 miles have been improved, making a total of 1,008.8 miles of improved state highways.

Unsurfaced Roads

The subject of the construction and maintenance of unsurfaced roads, particularly in the South, was discussed in a paper bearing the above title presented at the recent road congress at Detroit, Mich., by State Highway Engineer W. S. Keller, of Alabama.

Unsurfaced roads were divided by Mr. Keller into three classes: First, the ordinary country road—opened when the country was new—which leads from one settlement or farm to another, with little attempt at grading or alignment; second, ordinary graded earth roads which are properly aligned, graded and drained; and, third, those roads which have not been artificially surfaced but which, because of the character of the soil in which they are built, are to all intents and purposes surfaced roads.

The really bad roads in the South, according to Mr. Keller, are those included in the first class. It is difficult to better the alignment and grade on these roads because buildings have been put up close to them, and an undue amount of work is necessary to maintain, or even keep them in passable condition, because they were never really constructed. These roads are being relocated in many places to meet the demands of modern traffic, and until the making of such relocation as is necessary to avoid heavy grades, marshy bottoms and sharp turns and to provide proper drainage, they may be expected to be bad.

In regard to the construction of the second class of unsurfaced roads, State Highway Engineer Keller states that while the work is simple its simplicity often causes the average county commissioner or supervisor to over-estimate his ability as a road builder. The first step in the reconstruction of these roads, according to Mr. Keller, should be an inspection by the proper official for the purpose of ascertaining what changes in grade and alignment should be made, taking into consideration both the additional cost and the cost of maintenance. Center lines and grades should be established by an engineer and the width of the roadbed decided upon before work is commenced. A proper and efficient grading force should consist, according to Mr. Keller, of the following men and equipment: One foreman; one dump man and one loader, with five or six extra men for grubbing and other work; eight or ten good 2-horse teams with drivers; one wheel and one drag scraper for each team; one extra wheeler and drag for emergencies; one good railroad grading plow; one grading machine, and one split log drag. The completed road should have a uniform crown of 1 in. to the foot, which on grades should be increased so that the water will run to the ditches instead of down the road. Drain pipe should be used freely and no water allowed to flow over the road if it can be avoided.

State Highway Engineer Keller states that in the South there is nearly every kind of soil from sticky gumbo to coarse sand, and that the worst roads are those in the rich and fertile prairie lands where there is very little road building material to be found. The soil in these places readily absorbs water, becoming sticky after rains, and when the sun shines expands freely, dries rapidly and becomes very hard under traffic. He states that these roads require a very high crown and should be built with the driving surface only wide enough to allow two vehicles to pass, for if a road is narrow and has a fall of not less than 1½ ins. to the foot from the center to the ditches water will run rapidly to the sides and the surface will dry quickly. Except where grades are to be reduced or bottoms filled, a road of this kind, according to Mr. Keller, can be constructed with a grading machine, or even with a split log drag, at little expense.

In sections of the country where the soil is composed of gravel, sand-clay or top soil the roads will be of the third class and when graded will really be surfaced roads. In such sections good roads can be built at a very low cost.

In regard to the maintenance of unsurfaced roads, State Highway Engineer Keller states that it is radically different from the maintenance of those which are surfaced. He holds that while the patrol system used on macadam roads would be entirely inadequate for earth roads, one man, by the use of a drag, can keep 20 miles of ordinary graded earth road in good condition. He also emphasizes the fact that obstructions must be removed from a road and proper drainage provided before the drag can be used effectively, and cites an instance in road work in Tennessee County where graded roads completed in November were dragged during the four months following and were kept in good condition at very little cost.

In many of the southern states roads are maintained by statute labor, and in referring to this phase of the subject State Highway Engineer Keller states that though some of it is practically worthless it is impossible to entirely abolish the system and the question confronting the authorities is how it can best be applied to the maintenance of the roads. He says that good results have been secured in several counties in Alabama by putting the work in charge of a few foremen who are regularly employed and who give all their time and attention to the work, instead of leaving it to many overseers who work when it suits their convenience. The foremen are supplied with two or three teams and drivers, scrapers, grading machines, split log drags and various tools, and each is given as much territory as he can handle satisfactorily. Early in the year a census is taken in each foreman's territory of all men subject to road duty and the foreman is furnished with a list of names and required to see that every man works who has not paid the required amount of cash into the treasury in lieu thereof. Mr. Keller states that, although this method has proven good in most cases he does not think that the best results can be secured by permitting men to work out their road taxes.

Highway Work in Tarrant County, Texas

According to a report of J. C. Travilla, who is in charge of Tarrant County's $1,000,000 road system, a total of $206,638 has been expended in highway construction in the county during the period of six months ending Oct. 31.

The various roads on which money was spent during this time are as follows: Grapevine Road—May, $112.50; June, $375; July, $1,416.88; August, $3,298.32; September, $1,471.44; October, $4,072; total, $10,747.66. Section B of the same road—June, $486.12; July, $5,140.45; August, $5,298.01; September, $4,551.44; October, $5,847.71; total, $22,324.39. Dallas Road—May, $1,419.62; June, $4,488.19; July, $10,895.38; August, $10,765.68; September, $6,778.78; October, $11,843.32; total, $46,191.32. Mansfield Road—Section A, May, $270.19; June, $1,559.70; July, $2,391.62; August, $2,701.81; September, $1,807.60; October, $4,119.26; total, $12,850.26. Section B of the same road—July, $388.20; August, $459.45; October, $3,074.51; total, $5,589.84. Burleson Road—August, $1,152.39; September, $1,502.44; October, $2,217.95; total, $4,872.78. Cleburne Road—June, $1,188.11; July, $1,746.20; August, $1,523.31; September, $1,671.03; October, $8,223.78; total, $44,892.86. Weatherford Road—May, $898.82; June, $4,173.62; July, $13,279.79; August, $11,383.72; September, $6,933.12; October, $8,223.78; total, $44,892.86. Azle Road—May, $1,013.07; June, $3,328.52; July, $3,621.56; August, $6,815.37; September, $5,583.04; October, $5,528; total, $25,888.56. Keller Road—May, $88.20; June, $1,657.03; July, $4,353.98; August, $7,990.69; September, $4,096.61; October, $7,141.83; total, $25,328.34.

Construction of a Section of State Highway in Elk County, Pennsylvania.

Among the state highway contracts now under way in Pennsylvania one which has a number of interesting features is that for the building of a section of road in Elk County. The road is a part of Route No. 99 of the system of state highways established by the Sproul bill and extends from the east line of Ridgway Borough to the west line of St. Marys Borough through Ridgway and Benzinger townships. It is 45,209 ft. in length and 26 ft. wide, the pavement being 16 ft. in width. The maximum difference in the elevation of the finished grade was 194.48 ft., the maximum curvature 40 degrees and the maximum grade 6.12 per cent.

The contract for the work was awarded to Charles T. Eastburn, of Yardley, Pa., and work was started on May 19, 1913. The date fixed by the State Highway Department for its completion is Nov. 1, 1914. The road extends along a narrow mountain road with the Elk River on one side and hills on the other. The contract includes the making of 95,230 cu. yds. of excavation and 40,528 cu. yds. of fill, the construction of 10,000 lin. ft. of French drain, the laying of 1,083 lin. ft. of double strength terra cotta pipe of 12, 16, 18 and 24-in. sizes and of 891 lin. ft. of 12, 15, 18 and 24-in. concrete pipe reinforced with wire mesh, the construction of 11,942 cu. yds. of concrete foundation and 70,260 sq. yds. of asphaltic concrete (Warrenite), and the building of 10,104 lin. ft. of wooden fencing. The drainage conditions required the construction of four open culverts of 1:2:4 concrete of the following dimensions: 5 by 12 ft., 3½ by 12 ft., 2 by 4 ft. and 3½ by 6 ft. The work also included the construction of one I-beam and reinforced concrete bridge, built according to the plans of the State Highway Department, utilizing the old stone masonry abutments originally in place.

ROUGH GRADING WITH STEAM SHOVEL—ROAD IN ELK COUNTY, PA.

PLANT FOR CRUSHING LOCAL LIMESTONE FOR CONCRETE AGGREGATE.

The rough grading was done by means of three ⅝-yd. Bucyrus traction shovels and one 1¼-yd. Marion traction shovel. Stakes for the work were set as ordinary slope stakes for railroad construction and the section calculated as a level section. The subgrade elevation was taken as that of the center line of the road. The excavated material, where not wasted at the side, was loaded into 1-yd. steel dump cars traveling on a 24-in. gauge track and transported by gravity or by horses to the points where fills were to be made. In building up the fills the tracks were shifted from side to side of the road and the earth deposited in layers, the rolling being carried on at the same time.

After the completion of the rough grading the center line of the road was run in again and stakes put in 12 ft. from the center line every 50 ft. and at the P. C.'s and P. T.'s of all horizontal and vertical curves. Gangs equipped with picks and shovels, designated as the subgrading gangs, then went over the road, working from the stakes and from templates to bring the subgrade into shape. The subgrading gangs usually placed all of the pipes and such French drains as were found to be necessary. They also excavated and refilled with approved material such soft and spongy places as developed. The subgrade was rolled during this work and finished within 1 in. of grade.

After the subgrading gang had finished, the side stakes were checked for line and grade, where necessary, and were then used for placing the forms for the concrete base. These forms consisted of 2-in. by 10-in. planks from 6 to 16 ft. long, the shorter pieces being used on the curves of short radius. The planks were held in place by iron pins driven into the subgrade on each side. The concrete used in the foundation was a 1:3:6 mix and was delivered to the road from a Ransome batch road mixer. It was deposited to a depth of 5 ins. and leveled off by templates resting on the side forms. As soon as possible after the laying of the concrete base, 2x4-in. dressed planks to serve as the inside of the curb forms were placed on top of the concrete 12 ins. from the inner faces of the pavement outside forms. The space between the two forms was then filled flush with concrete, making a curb 2 ins. high, which was given a trowel finish. The stone and sand used in the concrete were crushed by the contractor from the native sandstone along the side of the road, and Lehigh Portland cement was used throughout.

The wearing surface of the road consists of a 2-in. course of Warrenite. This material is mixed in the portable mixing plant shown in the accompanying illustration. In plants of this type the mineral aggregate, consisting of crushed stone, screenings and sand, is proportioned and mixed, dried in a revolving drum heated by an oil blast, and then transferred to a mixing chamber where the heated bitumen is added and mixed with the aggregate. It is discharged from the mixer at a temperature about 250° F., loaded into wagons and transported to the roadway. Before laying the surfacing the concrete is swept clean with brooms and all ridges and humps in the concrete which would be nearer the

PORTABLE WARRENITE MIXING PLANT FOR PREPARING SURFACING MIXTURE.

surface than 2 ins. are removed. Each load of Warrenite is dumped far enough ahead of the finished surface so that the entire load has to be forked over before it is in place, thus avoiding spots of unequal density due to dumping. The surface is then rolled with a 10-ton, 3-wheeled steam roller, the wheels of which are oiled sufficiently to keep the material from sticking to them, the thickness being frequently tested by a gauge during the compacting. The surface is finished to a template, hollows being filled as soon as discovered and the rolling continued until the surface is smooth. After the Warrenite has been laid and rolled, and usually while it is still warm, a seal coat of bituminous material is applied by means of a squeegee box, the surface covered with limestone screenings, and again rolled.

The Purchasing System of the Maryland State Roads Commission.

In a paper entitled "Systematizing the Purchase of Road Materials and Equipment" presented at the road convention at Detroit recently, Chief Engineer Henry G. Shirley, of the State Roads Commission of Maryland, gave a detailed description of the system used by the commission in purchasing materials and equipments.

Under the system inaugurated in 1912, the first step in securing material or equipment is the making out, in duplicate, of a requisition by a resident engineer, a superintendent or a department head. The duplicate is retained by the maker and the original sent to the chief engineer for his approval, after which it is submitted to the chairman of the commission for his approval and then to the purchasing agent for his signature.

SPREADING, RAKING AND ROLLING WARRENITE SURFACING—ELK COUNTY, PA.

When the purchasing agent has signed the requisition he gets into comunication with firms or individuals who can furnish the supplies desired and requests that bids be submitted by a certain specified time. After the bids are received and the contract is awarded to the lowest responsible bidder, an order for the material is made out on a special blank. The order accompanied by three bill forms, is then sent. The bill is made out in triplicate on these forms, by the consigner, the original forwarded to the purchasing agent together with the bill of lading, and the duplicate and triplicate bills sent by the consigner to the person for whom the supplies were purchased. This engineer or other agent of the commission signs the duplicate and forwards it to the head of the department, keeping the triplicate for his own files. The purchasing agent forwards the original bill to the head of the department, who certifies that the supplies were received on a certain date and that the goods were as ordered. The original bill is then returuned to the purchasing agent for his certification that the supplies shown were purchased under an approved requisition and that the account is correct. The bill is then sent to the auditing department after the names of the county, contract number and the item number to which it is to be charged have been placed upon it.

The requisition shows whether the material or equipment is to be used by the construction or the maintenance department, the contract number of the work on which it is to be used, the name or names of the person or persons and the railroad station to whom the supplies are to be shipped, the section of road on which the supplies are to be used and the name of the county in which the road is situated. The body of the requisition shows the quantity and description of the articles, where ordered, the order number and the requisition number.

On the order blank is specified each item, the requisition number and the person for whom the material or equipment is to be shipped. On the back of the order are general directions and information regarding the regulations of the department.

The bill form shows the order number, the requisition number, the date of shipment, the name of the consignee, the car number and initials, the name of the firm from which the supplies were secured and the date on which the purchase was made.

City Planning Exhibition at New York City.

The City Planning Exhibition in the New York Public Library was officially opened to the public on Monday, Nov. 24. President Cyrus C. Miller, of the Borough of The Bronx, had been scheduled to deliver the opening address, but owing to an important business engagement he was unable to attend and Amos Shaffer was delegated to read the address prepared by Mr. Miller. The address dealt principally with the laying out of streets and the other features of the commercial growth of a city.

Among the exhibits are many photographs and maps, among them a diagram of proposed street widths in St. Paul, Minn.; proposed street cross sections in Erie, Pa.; proposed cross sections of highways and parkways in Houston, Tex.; diagonal street widths in Australia; a diagram of the cross section of 161st St., New York, N. Y., shown in connection with the proposed extension of Riverside Drive, and many others.

The committee appointed by the Board of Estimate and Apportionment to arrange for the Exhibition consists of George McAneny, President of the Borough of Manhattan; Lewis H. Pounds, President of the Borough of Brooklyn, and Cyrus C. Miller, President of the Borough of The Bronx.

Bond Issues for Road Improvement.*

The importance of road financing has always been recognized, but the principles underlying it have been discussed but little. Assuming that the highways belong to the public and that their condition has a very important bearing upon the economic, social, educational and religious advancement of citizenship, it is the duty of the people to provide for their improvement and maintenance through the public revenues. The questions then arise of whether the money for this improvement should be provided by tax levies or by issuing bonds, and what the conditions are which require the latter method.

Good public policy demands that borrowing money should not be resorted to in public affairs unless (1) there is urgent need for the improvement, (2) the improvement is of such magnitude as to prevent its being paid for through the regular course of taxation or (3) the improvement is to be of sufficient permanency so as to give full value to those called upon to pay the indebtedness.

Need for the Improvement

The food problem which confronts the world today, as it has confronted the world in the past and will confront it in the future, is so great that every fraction taken from the cost of production or transportation means the saving of millions. While railroad rates were reduced nearly 90 per cent. between 1837 and 1905, no reduction has been effected in the cost of highway transportation. The present cost of hauling to shipping points has been estimated at more than $500,000,000 annually, and it has been further estimated that by the proper improvement of the highways this can be reduced over 50 per cent.

In 1890, 36 per cent. of the people lived in the cities; by 1900 the percentage had increased to 40 and in 1910 to 46. This increase of 10 per cent. in the urban population in 20 years has depleted the food-producing population to an alarming extent, and the question of the movement from the farm to the city can not be solved until the highways are improved. The development of social life, school life and religious welfare in the country also depends upon the improvement of the roads. These needs are far greater than the economic, though they are not so tangible and do not so readily appeal to the people.

The urgent need for roads is further indicated by the demand of the people for highway improvement. One evidence of this demand was furnished by the good roads days held recently in Missouri. Another is found in the rapidly increasing number of good roads associations and similar organizations. The attitude of the press is an indication of this demand, and still another was the number of bills for federal participation in road building introduced in the Sixty-second Congress.

The greatest factor in this demand for good roads is the motor vehicle, the coming of which will produce good roads 25 and perhaps 50 years sooner than they would have come by reason of all the other forces combined. The increase in the use of the automobile in the rural districts was illustrated by a traffic census taken near DeKalb, Ill., during the first six months of 1907, during August and September, 1912, and during August and September, 1913. In 1907 the motor traffic was 5 per cent. of the total, in 1912 it was 50 per cent. and in 1913 it was 60 per cent. Another illustration was furnished by an annual meeting of the DeKalb County Soil Improvement Association held near DeKalb, Ill. The attendance was estimated at 1,100, of which at least 90 per cent. were farmers. There were on the grounds 26 horse-drawn vehicles and 109 automobiles.

Magnitude of the Project

In order to determine whether the work is too large to be paid for from the ordinary revenue, it is necessary to ascertain what amount is required and what particular taxing bodies should stand the expense. There are approximately 2,200,000 miles of country highway in the United States, of which, it is estimated, from 15 to 20 per cent. carry from 80 to 90 per cent. of the total traffic, and it is further estimated that from 15 to 20 per cent. carry approximately 60 per cent. of all farm traffic. This mileage of 20 per cent. (440,000 miles) would be sufficient to cross most of the states, both north and south, and east and west, every six miles and would include all of the main market roads, intercounty, interstate and transcontinental roads. It is estimated that 11 per cent. of the roads are already improved, this including all classes of improved roads such as gravel, macadam, brick and concrete. It is probable that less than 5 per cent. (110,000 miles) are so improved that they will wear more than ten years even if well maintained, and it is believed, therefore, that the mileage yet to be improved is not less than 300,000 miles.

Let us divide this 300,000 miles into two classes—roads having a total length of approximately 50,000 miles connecting all the state capitals and the larger cities, and the main market roads, 250,000 miles in total length, connecting county seats, cities and villages. The first 50,000 miles referred to being main traveled roads should be from 18 to 20 feet in width, and the others should vary from 12 to 16 feet in width, depending upon the probable traffic.

The cost of improving this system will depend upon the material as well as upon the width. As motor traffic is increasing and probably will increase both in the number of vehicles and their weight, the main traveled roads should be built with substantial foundations and with hard wearing surfaces. The construction of the 50,000 miles referred to would cost not less than $15,000 per mile, or a total of $750,000,000. The 250,000 miles of roads from 12 to 16 feet in width would cost about $10,000 per mile, or $2,500,000,000, thus making the total cost of the entire 300,000 miles $3,250,000,000.

We can now consider what political divisions or taxing bodies should be responsible for this expenditure. On the theory that road conditions were purely local matters, state road legislation in the beginning put the entire responsibility for road improvement upon the smallest divisions—namely, townships or road districts. Later this method was found insufficient and in some states the counties were made the units. A little later the county system was found inadequate and most of the states have taken part in the work through state aid. The work, however, has grown so rapidly that it is becoming apparent that the assistance of the federal government will soon be needed.

The government has practically completed the Panama Canal at a cost of from $300,000,000 to $350,000,000, and the time is now ripe for the government to undertake a work of more direct benefit to the people and one which, from the standpoint of the effect upon the food supply of the nation and from the standpoint of citizenship and a contented farm life, is more important than a score of Panama canals. The government appropriates very liberally each year for public buildings and for the improvement of rivers and harbors, and though much of this work is necessary none of it is of so much benefit to the people as would be the same amount of money applied to the development of a well planned highway system. This project would soon be under way if all of the associations now working for road improvement could unite in asking Congress to authorize the appointment of a commission to conduct a thorough investigation and report back to Congress a plan under which the government should enter into the work; to report, also, whether the government should construct and maintain a system of national highways or give the states assistance in improving their roads, and, further, to provide a plan by which the roads to be improved should be designated.

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*Abstract of a paper read by S. E. Bradt, Secretary of the Illinois State Highway Commission, at the third American Road Congress, Detroit, Mich., Sept. 29 to Oct. 4, 1913.

If the premises in the foregoing discussion are granted to be true, it may be concluded that we are warranted in asking the government to assist in this work over a period of 15 to 20 years, at least to the exent of the cost of the 50,000 miles of road estimated to cost $750,000,000. Congress has authorized the issuing of bonds for the construction of the Panama Canal, and should the government revenues require it bonds should likewise be issued for the construction of highways. If the government should undertake to furnish this $750,000,000 there would still remain the sum of $2,500,000,000 to be contributed by the states and counties in proportion to the total mileage in each. This money, spread over a period of 15 years, would mean an annual cost of approximately $166,000,000 to the states and counties.

The estimated annual traffic loss is $250,000,000, and when the roads that carry from 80 to 90 per cent. of this traffic are improved there will be effected a saving of from $200,000,000 to $225,000,000 annually, so that from this standpoint the improvement will soon pay for itself. Again, the annual expenditure for roads and bridges in the United States is estimated at $180,000,000, of which $150,000,000 is raised by general taxation and $30,000,000 by bond issues. Of this sum of $180,000,000—which is largely in excess of the annual expenditure called for in the proposed system of roads—$100,000,000 is being expended for the construction and repair of bridges and culverts and for the maintenance of earth roads, while the remaining $80,000,000 is being expended for the more permanent types of construction. For years to come these earth roads will form the larger part of the highway system and they must not only be cared for as they have been in the past but their efficiency must be increased by more thorough and scientific methods of maintenance.

It is generally conceded that at least 25 to 30 per cent. of the money expended on earth roads is used in a way that brings no permanent benefit. This means that $75,000,000 economically expended would produce a better system of earth roads than at present and leave $25,000,000 for other purposes. If this $25,000,000 were added to the $80,000,000 now expended on our roads there would be $105,000,000 for that purpose, thus leaving only about $60,000,000 still to be provided for. Without question, the taxes for the maintenance of state governments, municipalities, schools and roads are already a sufficient immediate burden. Hence it is justifiable to take the position that this project is too large to be paid for through the regular channels of state and county taxation and that at least the $60,000,000 previously referred to, in addition to the $30,000,000 now being raised by bond issues, should be provided for by the same method —namely, the issuing of bonds.

Permanency of the Improvement

The third requirement is that the improvement shall be of sufficient permanency to give full value to those who will be called upon to repay the indebtedness, or, in other words, that the majority of the bonds shall come within the life of the improvement. This principle has often been disregarded by states and by municipalities, not from a desire to impose a burden upon those who have to pay the cost, but from a lack of correct information as to the durability of the work for which the bonds were issued. This has probably been excusable to a certain extent in the case of road construction because of traffic changes that could not be foreseen. At present it is possible to judge sufficiently of the traffic requirements for the next 20 years so as to build roads to meet them, and it follows, therefore, that since the coming generation will share in the benefits of the roads, equity demands that it shall also share in the cost, as it can do only if bonds are issued. We do not hesitate to issue bonds for other public improvements, none of which are permanent, all of which require maintenance and many of which require frequent renewals to maintain their efficiency. If we attempted to build this system of roads by spreading the work over a period of 15 years, building one-fifteenth each year, paying one-half of the cost of this by direct taxation and issuing 15-year bonds for the remainder, the cost would be distributed over a period of 30 years, a section of road would be paid for within 15 years of the time of its construction, the burden upon the taxpayers would be but little more than at present and by a proper organization of the work by the states and counties the money would be conserved, haphazard work eliminated and the people would receive real value for the money expended.

Traffic on Wayne County Roads.

Traffic counts on six of the concrete roads in Wayne County, Michigan, were taken in August of this year and again in September, each count extending over a period of seven days and being taken throughout the 24 hours of each day. The results of the counts are included in the seventh annual report of the Board of County Road Commissioners, which is noted on another page of this issue. The tables in the report give the number of vehicles for each 24 hours, while the accompanying tables give only the totals for the week.

The August count on the River Road was taken from 6 p. m. Aug. 21 to 6 p. m. Aug. 28, while the August counts on the remaining five roads were made from 7 p. m. Aug. 18 to 7 p. m. Aug 25. The September count on the River Road was made from 6 a. m. Sept. 21 to 6 a. m. Sept. 28, while the September counts on the remaining five roads were taken from 7 p. m. Sept. 18 to 7 p. m. Sept. 25.

TABLES SHOWING RESULTS OF TRAFFIC COUNTS ON CONCRETE ROADS IN WAYNE COUNTY, MICHIGAN.

AUGUST.

	Horse-Drawn Vehicles			Motor-Driven Vehicles				Totals		
		Double Teams								
Road	Single Horse	(Light)	(Loaded)	Runabout	Touring Car	Motor Cycle	Truck	Horse-Drawn	Motor-Driven	All Vehicles
Woodward Ave.	771	532	485*	2,059*	10,099*	525*	595	1,788	13 278	15,066
Gratiot	2,244	1,295	1,389	600	2,528	333	265	4,928	3,726	8,654
Grand River	1,548	530	1 157	1,054	2,543	221	391	3,235	4,209	7,444
Michigan Ave.	1,403	396	505	569	3,556	489	169	2 304	4,783	7.087
River	508	155	133	337	2,146	415	84	796	2,982	3,778
Van Dyke	984	555	702	388	644	223	102	2,241	1,357	3,598
SEPTEMBER.										
Woodward Ave.	1,280	859	576	3,573	12 482	1,309	1,107	2,715	18,471	21,186
Gratiot	2,554	1,386	1,376	840	1,457	373	298	5.316	2,968	8,284
Grand River	1,948	523	1,091	783	2,654	135	346	3,562	3 918	7,480
Michigan Ave.	1 218	836	738	598	2,166	302	159	2,792	3,225	6 017
River	514	201	232	349	1,677	261	99	947	2,386	3,333
Van Dyke	1,423	566	1,222	374	1,108	194	176	3,211	1,852	5,063

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*These figures are not exactly correct since on one day the automobile traffic was unusually heavy and the only figures appearing in the traffic count for that day are the number of single-horse vehicles, the number of motor trucks and one item of 3,665 vehicles, which in the tables is carried to the total of touring cars.

Highway Accounting With Especial Reference to Maintenance.

In a paper bearing the above title, presented at the recent road congress in Detroit by H. P. Gillette, Editor-in-Chief of "Engineering and Contracting," the author urges the adoption in road work of the accounting methods followed in other branches of public utility work. The time is at hand, he believes, when the methods of accounting and cost keeping that have proven effective in the management of private enterprises will be applied also to public work. He argues that there is no fundamental economic difference between a road and a railroad and, therefore, that the accounting methods which have been developed in the construction and operation of the latter should prove equally efficacious for roads.

Every well managed railway, according to Mr. Gillette, has an itemized plant or property account and an itemized maintenance account showing the monthly and annual maintenance expenses by divisions. Further, every such railway company carefully distinguishes between expenditures that add to investment in plant and expenditures that merely renew superseded and worn-out parts of the plant. He asks how many of the accounts of highway systems will show the itemized investment in the entire mileage or the monthly and yearly maintenance expenses; how many will indicate a careful distinction between expenditures adding to investment and expenditures for renewals, and points out that in many published statements of road maintenance costs not more than one-half of the amount charged up is maintenance at all.

As an example of the distinction between maintenance expenses and expenditures for betterments which should be charged to property accounts, Mr. Gillette cites the cost of an old water bound macadam road which is scarified and covered with new metal. If only enough is added to bring the road to its original thickness the cost of the work is a maintenance expense, while if enough is added to make the macadam 8 ins. thick, where it was originally constructed 6 ins. in thickness, the cost of the added 2 ins. of stone is not a maintenance expense but an addition or betterment properly chargeable to the property account. Maintenance expenses, he points out, should never include anything except repairs and renewals, and any expenditure adding to the inventory cost is an addition or betterment and should be charged to the property account.

His personal preference in regard to maintenance accounts is to keep two kinds—repairs and renewals. Under the former are charged the cost of patching, patroling and other small or continuous expenditures, while under renewals are charged general resurfacing and the renewals of large sections.

Mr. Gillette points out that since a properly kept set of construction and expense ledgers is seldom left to a highway official by his predecessor there is often a question as to whether it is worth while to inventory the existing roads. He holds that it is, since one of the best ways of rating the annual maintenance cost of any structure or machine is as a percentage of its first cost and as estimates of future maintenance expenses are often best made by taking percentages of the first cost of each item.

For the property account of a highway system, Mr. Gillette suggests the following account headings: (1) Engineering, superintendence and inspection; (2) administration and legal; (3) real estate and right of way; (4) clearing and grubbing; (5) grading; (6) retaining and slope walls; (7) bridges, culverts and drains; (8) fences and signs; (9) trees, sod and foilage; (10) paving; (11) buildings and fixtures; (12) furniture and instruments; (13) stores and supplies; (14) tools and machinery; (15) miscellaneous; (16) bond discount; (17) interest during construction.

All existing roads, he holds, should be appraised at the cost of reproduction new, and though the depreciation may be ascertained it should be taken care of by a separate account rather than deducted from the value of the system. After having opened the construction ledger, using as a starting point the appraised cost of reproduction new, he recommends the keeping of the cost of every new road and every betterment, item by item, in that account. In the case of all new work the estimated quantities and costs should be kept in such a way as to permit ready comparison with the actual figures after the work is done. Various forms for taking care of the details of accounts are recommended.

In addition to the system of accounts summarized in the construction and maintenance ledgers, Mr. Gillette holds that there should be a separate system of unit cost records which, unlike the ledger accounts, need be only approximate. These records should be kept even for the smallest jobs as they are of great value to the engineer. One of the advantages in such records, according to Mr. Gillette, is the showing of the relatively greater expense of small jobs. He holds that much money is wasted in "puttering," most of which can be done away with entirely. He holds that this is particularly true of road maintenance and believes that too much of this work consists of patching in small units and that "there is not a little economic falsehood in applying too literally the 'stitch in time' policy." Unit costs, he holds, will show to what extent it is economical to use the patrol system in repairing and will also supply the answer to the question as to whether contract work or day labor is the more economical.

New Federal Aid Bill.

A bill providing that the United States shall in certain cases aid the various states and their civil subdivisions in the construction and maintenance of rural post roads has been introduced in Congress and referred to the Committee on Roads. The bill was introduced in the Senate by Senator Hoke Smith of Georgia, and in the House of Representatives by Dorsey W. Shackleford of Missouri.

Section 1 of the bill provides that the amount of money which may be expended on behalf of the United States in aiding the respective states in the maintenance and construction of post roads shall not exceed $2,000,000 in any fiscal year. It also provides that between Feb. 1 and June 30 of each year the Secretary of Agriculture and the officials of the various states may jointly determine the roads to be constructed and maintained, and the material, character and manner of construction and maintenance. In no case shall the United States bear more than one-third of the cost.

The second section of the bill provides that certain roads used regularly by the United States as rural post roads be divided into three classes, to be known as Class A, embracing roads constructed of macadam; Class B, roads constructed of gravel, and Class C earth roads. It provides further that on or before the first day of March the governor of any state may file in the office of the Secretary of Agriculture a report setting forth the location, number and condition of roads in such state, and in which class they belong.

Provision is made in this section of the bill that at the expiration of each fiscal year the United States shall pay for all roads in Class A the sum of $60 per mile; for all roads in Class B, $30, and for all roads in Class C, $15. The amount of money that may be expended under this section during the course of any year shall not exceed $20,000,000, and the amount which may be spent in any state shall be in the proportion which the total number of miles in the state bears to the total number of miles in all the states.

The County Highway Commission of San Bernardino County, Cal., has definitely decided upon the roads which will be improved by the proceeds of the $1,750,000 bond issue, provided it carries at the election which will be held about the middle of December. Practically all of the roads which have been requested for various sections of the county are scheduled for improvement.

Report on the New York State Highway Department

Shortly after becoming State Commissioner of Highways of New York last spring, John N. Carlisle appointed a Board of Consulting Engineers, consisting of George C. Diehl, County Superintendent of Highways of Erie County, Harold Parker, First Vice President of the Hassam Paving Co., and Wm. DeH. Washington, to investigate the conditions existing in the department and report to him, making such recommendations as seemed desirable. The report of the board has recently been submitted and made public, and is noted briefly on another page of this issue.

The first few pages of the report are given to a history of the road movement in New York state, beginning in 1890 when David B. Hill, who was then governor, directed public attention to the improvement of the roads of the state. This part of the report takes up in detail the original good roads laws of the state—the Higbie-Armstrong and the Fuller-Plank acts—and also notes the various changes that have been made in the laws since that time.

Following this is a brief outline, accompanied by a chart, of the proposed organization of the department, and the same subject is taken up in more detail later in the report where the various duties of the several officers and employees are listed. The proposed organization provides for the division of the work of the department into three parts: (1) Highway construction, maintenance and the supervision of town highways, under the direction of the chief engineer; (2) records, under the direction of the secretary, and (3) fiscal affairs, under the direction of the auditor. The organization of the department and the relation of these and other officials and employees of the department to each other and to the commissioner are shown in the accompanying reproduction of the organization chart included in the report. In explanation of the duties of the different officers and employees of the department the report states as follows:

> Under the suggested plan the commissioner shall be the administrative and executive head of the department, and he shall have a private secretary and two or more personal advisers, subject to his call for technical consultation and for investigation and research for the purpose of improving and developing the types of highway construction used or to be used in the state. His dealings with the regular work of the department would be normally through the chief engineer, secretary and auditor.
>
> The chief engineer shall be appointed by the commissioner and shall hold office during good behavior. His headquarters shall be in Albany and in his office shall be the deputies, special residencies and clerks to handle the office work and any technical investigations that may be necessary, including the preparation of information and statistics on road work, the conduct of tests and research work, the examination of plans, maps, designs, standards, etc., and the care of correspondence.
>
> The actual work of constructing and maintaining roads shall be controlled by the chief engineer through two deputies, each in charge of a specified portion of the state, the division to be made so as to place approximately the same amount of work on each of the two deputies.
>
> The only change in the existing law required to put this plan of organization into effect is in the arrangement of duties of the chief engineer and the two deputies. The present law provides for three deputies, having in charge respectively, plans and construction, maintenance, and town highways; whereas, under the plan suggested, each deputy handles all three of these functions. These deputies shall have their headquarters in Albany, and each should be assigned a resident engineer to take charge of affairs in his absence and in a general way to act as his private and executive secretary and chief clerk. Until the law can be amended three deputies as provided by the present law could be used to put the proposed plan into immediate operation or preferably discharge the duties as at present through a temporary modification of the proposed plan.
>
> The state is divideded into nine divisions, each in charge of a division engineer.
>
> Each division engineer shall have in his office a resident engineer competent to act in his absence and to have special charge of surveys, plans, maps, designs, estimates, payments on contracts, etc. He shall also have a chief clerk to care for correspondence, files, preparation of vouchers, etc.
>
> The field work of each division shall be divided into approximately seven sections with an assistant engineer in charge of each. These section engineers shall report to the division enginers and shall be responsible to them.
>
> Attached to each deputy engineer's office shall be survey parties to be assigned to the various divisions.
>
> Under the direction of each division engineer shall be three gangs with motor trucks, each to maintain approximately 150 miles of completed state and county roads. The gangs shall be assigned by the division engineers.
>
> The secretary shall have charge of records, reports, and correspondence, as indicated on the chart. The amount of clerical assistance will vary within wide limits, depending largely upon the activity of road work.
>
> The auditor shall have charge of all matters of accounting, disbursements of funds and verifications of vouchers. His work will also vary in volume and he shall be provided with such clerical help as is necessary.

In another part of the report the detailed duties of each of the principal members of the organization are listed in full, and after that listing is the following comment on the operation of the system and the duties and responsibilities of the several officers:

> By the operation of the system presented in this report, the commissioner would be in touch with every part of the department, in such detail as might be necessary in any particular case, and in general so well informed that his grasp of the department would be complete.
>
> Under the provisions of the plan proposed and the choice of competent subordinates, it is believed that the operation of the different parts would be smooth, comprehensive and successful.
>
> As the chief engineer would be the responsible administrative officer of the department, it is particularly necessary that he should be selected with the utmost care in order to secure an engineer having technical knowledge, highway engineering experience, tact and administrative ability.
>
> He would have exclusive and sole charge of all engineering features. He would be in executive control of all the work of the division engineers and be subject only to direction of the commissioner. The chief engineer should transmit all orders to division engineers.
>
> He should establish uniform methods in the several divisions and coordinate their work. He should be continually in touch with the division engineers, so that his knowledge, experience and ideas should control the final product. His should be the directing mind which would produce efficiency, standardize operations, perfect organization, develop suggestions, and secure the cooperation of contractors, local officials and citizens generally and to insure to the public economical and effective expenditure of highway funds.
>
> The division engineer would be the executive officer of the division and have entire and exclusive charge of all work in his division. He would be held to a strict accountability and be unhampered and unrestricted in executing the directions of the chief engineer.
>
> His reports to the chief engineer would be a consolidation of the reports of his subordinates and treat of such other matters necessary to give the chief engineer a detailed, accurate knowledge of the division.
>
> The assistant engineer would have general supervision of the section to which he might be assigned.
>
> He would inspect monthly, or more often if necessary, each mile of completed highway, make a detailed report of the condition of each mile, an estimate of the amount required to be expended for the following month, a statement of the method of such repair, of the material required, etc. If the repair were of such magnitude as to require a formal contract, he would make all necessary surveys, examinations and estimates so that complete plans could be prepared by the division engineer. Before January 1st, he should make a complete detailed estimate and report of the work required on each mile of highway for the ensuing year. If exceptional conditions exist, he should report on shorter sections. He should direct the operation of patrolmen and maintenance gangs.
>
> He should furnish contractors with lines and grades, inspect,

> supervise and direct all operations of contractors; he would be responsible for the faithful performance of all contract work whether construction, maintenance or resurfacing.
>
> He should become acquainted with county, town and village officials. He should make at least one inspection annually and a separate report upon each gravel bank and stone quarry. He should examine at least twice annually the account books, vouchers, stubs, etc., of each supervisor and town superintendent of highways. He should report upon the town superintendent's annual estimate, and the agreement entered into between the town boards and town superintendent for expenditures for town highways and bridges. He should cooperate with county superintendents and assist as far as practicable in giving lines and grades for highways, bridges and culverts and furnish necessary advice in their construction and maintenance.
>
> The assistant engineer should furnish information to survey parties. He should make an examination of each proposed highway, report in minute detail regarding soil conditions, drainage and available materials.
>
> The highway inspector would carry out the orders of the assistant engineer and in general have charge of the inspection of all contract work, utilizing as far as practicable the services of rodmen and chainmen, when so directed by the assistant engineer. He should inspect the work of patrolmen when directed by the assistant engineer.

In regard to traffic census and statistics, the report recommends that a census be taken annually of each completed state and county highway and each highway for which plans and specifications are being prepared. It recommends, further, that accurate reports be kept of the original cost of each completed state and county highway, the annual expenditure for repairs and the cost of renewals; or, that in the absence of such costs an estimate be made of the life and of the annual amount properly chargeable to renewals and resurfacing. It recommends the making of careful computations to ascertain the annual cost of traffic per ton per foot of width on each of the generally accepted types of construction, for the purpose of determining the most economical type, and the keeping of a record of each employee to determine his comparative efficiency.

Referring to specifications, the report states that long trial has demonstrated that a specification should be brief, clear and explicit and not burdened with unnecessary legal verbiage, involved or obscure language. It is argued that every detail can not be covered in any given specification and that it is better practice to draw specifications embodying explicit descriptions admitting of no misunderstanding and a binding contract to do the work under a sufficient bond than to attempt to include each item involved in the work. A general specification of that type is therefore submitted with the report.

In regard to the determining of types, the report includes the following:

> The selection of the type of any given highway should be based on the trained observations and opinions of the subordinate officials, approved by the chief engineer.
>
> Statistical information carefully compiled will tend to establish an economic standard of highway construction and express definitely actual results which must be of greater value than the unsupported judgment of even the most eminent.
>
> By type is meant width of highway as well as the component materials. Such width must be determined by principles involving safe travel as well as by economy in design.
>
> The existing law provides that a locality may obtain a wider or more expensive type of construction by paying the increased cost over the plan designated by the state highway commissioner but it is believed that this should be so construed that the plan of any road appropriate to the location should be determined by the commissioner.
>
> These statements are intended to apply particularly to roads outside of incorporated municipalities. The expenditure of large sums in such municipalities, if extended along present lines would rapidly deplete the highway funds.
>
> In the design of a road or a bridge a certain safe loading must be assumed and the road or bridge planned to carry such weight. The opinion frequently advanced that a highway or bridge should be capable of carrying an unlimited load, however applied is unreasonable. Any such reasoning carried to a logical conclusion would result in a complete reconstruction of present highways and bridges
>
> It follows that wise restrictions should be established regulating the width and character of tires and limiting the maximum weight and width of vehicles using the public highways and that ample provision should be made for the stringent enforcement of such regulations.

In discussing state and county highways, the report reviews the method of apportioning the cost of both of these classes and gives data regarding the nature and extent of these two systems. It is urged that before proceeding further with improvements a careful and impartial study and report be made by a board chosen by the state highway commissioner to determine a proper state and county system, its approximate cost and a sound financial policy, and that pending the preparation of such report only those highways be selected for improvement "as manifestly and clearly form a part of proper state and county systems."

The present plans in New York provide for a system comprising the construction of 4,000 miles of state highways and 8,000 miles of county highways, or a total of 12,000 miles. According to the report, about 7,000 miles of these remain to be constructed from the proceeds of the second $50,000,000 bond issue and the average cost of the improvement can not be safely estimated at less than $14,000 per mile, making necessary the expenditure of a total of approximately $100,000,000. It is pointed out that under the existing statutes the counties contribute $14,000,000 which, with the state's $50,000,000, would amount to $64,000,000, which would be less by $36,000,000 than the amount required to complete the system. The report states that it is probable that a careful report such as that recommended would suggest a method of reducing the mileage to such an extent that sufficient funds would be available.

It is also pointed out that under the present conditions and the existing statutes the second bond issue will not be sufficient and that a revised plan must be adopted or else the system must be left incomplete and disconnected. The law requires that $20,000,000 of the second $50,000,000 be allotted to state highways and $30,000,000 to county highways, the latter sum to be apportioned among the counties taking into account their mileage, population and area. This method is unscientific, according to the report, and can result only in confusion and disconnected roads, and it is argued that the commission suggested could properly determine what should be complete systems within the present bond limits, but that a constitutional amendment would be necessary to make any change effective.

In regard to maintenance, the report states that a patrol system has been used in New York and has served fairly well but that it is somewhat discredited now on account of the methods of construction incidental to the use of self-propelled vehicles. It is believed, according to the report, that where the preservation of the road does not require actual reconstruction, a sectional organization under the direct supervision of the assistant engineer should be employed to keep the roads in condition. It is estimated that this maintenance by section gangs would effect a saving of $700,000 annually over the present method, would prolong the life of the roads and would keep them in better condition.

Continuing the report states:

> Careful reports should be made stating the actual condition of each completed state and county highway, and an accurate estimate of the cost of its maintenance, repair, or reconstruction. Unless the state and county highways heretofore completed are placed in a proper condition, without unnecessary delay, such enormous annual maintenance appropriations will be required as will discredit the entire road movement throughout the state
>
> The question of ways and means of taking care of maintence is a somewhat vexed one. It is perhaps unwise to attempt to make definite suggestions. Various more or less intricate schemes for financing maintenance costs have been proposed by which sinking funds could be provided for each road after completion. Under this plan, certain annual expenditures for

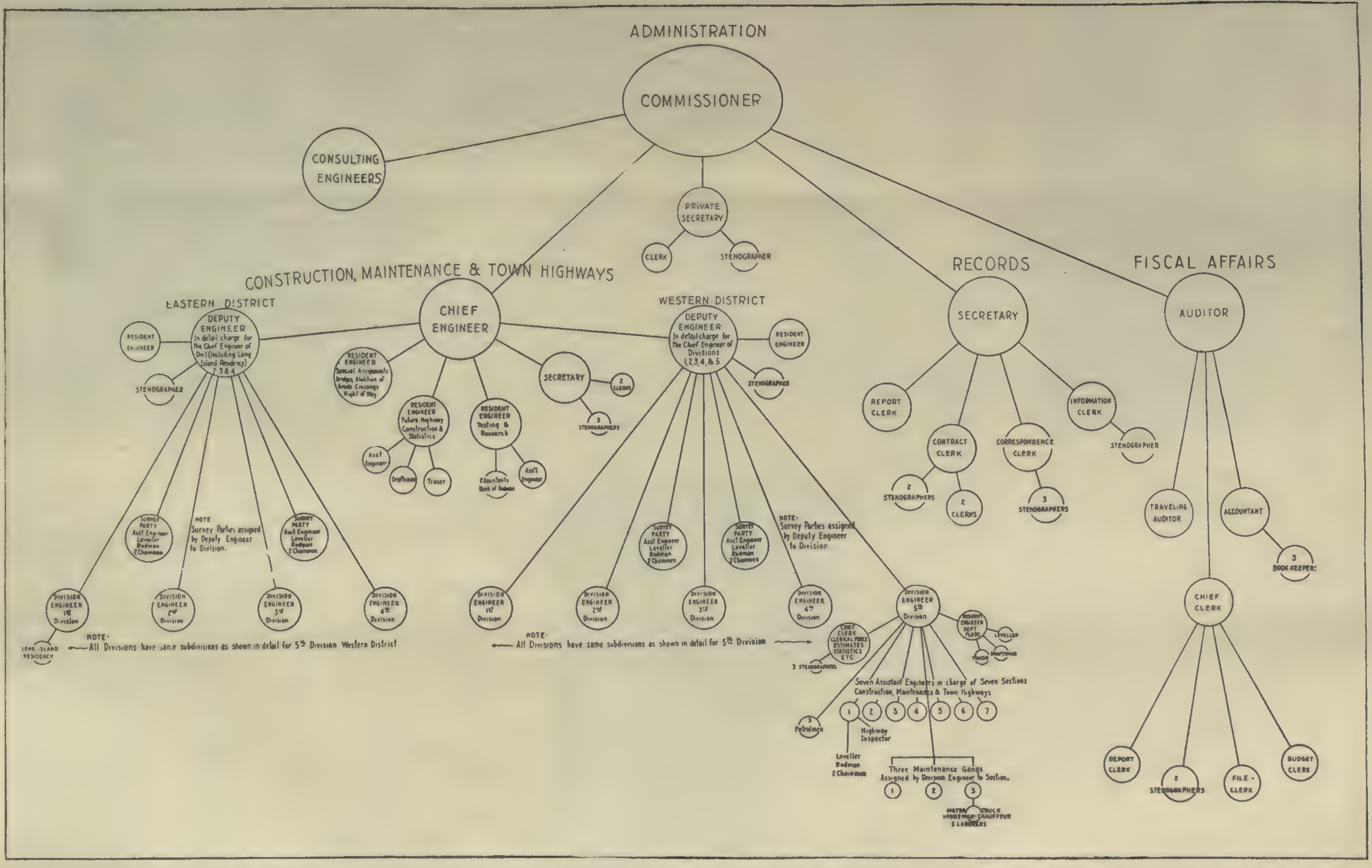
ADMINISTRATION
COMMISSIONER
CONSULTING ENGINEERS
PRIVATE SECRETARY
CLERK
STENOGRAPHER
CONSTRUCTION, MAINTENANCE & TOWN HIGHWAYS
CHIEF ENGINEER
EASTERN DISTRICT
DEPUTY ENGINEER In detail charge for the Chief Engineer of Div 1 (Including Long Island Residency) 2 3 & 4
RESIDENT ENGINEER
STENOGRAPHER
SURVEY PARTY Asst Engineer Leveller Rodman 2 Chainmen
NOTE Survey Parties assigned by Deputy Engineer to Division.
DIVISION ENGINEER 1st Division
DIVISION ENGINEER 2nd Division
DIVISION ENGINEER 3rd Division
DIVISION ENGINEER 4th Division
LONG ISLAND RESIDENCY
NOTE· All Divisions have same subdivisions as shown in detail for 5th Division Western District
RESIDENT ENGINEER Special Assignments Bridges, Abolition of Grade Crossings Right of Way
RESIDENT ENGINEER Future Highway Construction & Statistics
Asst Engineer
Draftsman
Tracer
RESIDENT ENGINEER Testing & Research
2 Assistants Bureau of Research
Ass't Engineer
SECRETARY
2 CLERKS
3 STENOGRAPHERS
WESTERN DISTRICT
DEPUTY ENGINEER In detail charge for the Chief Engineer of Divisions 1,2,3,4, & 5
RESIDENT ENGINEER
STENOGRAPHER
SURVEY PARTY Asst Engineer Leveller Rodman 2 Chainmen
NOTE: Survey Parties assigned by Deputy Engineer to Division
DIVISION ENGINEER 1st Division
DIVISION ENGINEER 2nd Division
DIVISION ENGINEER 3rd Division
DIVISION ENGINEER 4th Division
DIVISION ENGINEER 5th Division
NOTE· All Divisions have same subdivisions as shown in detail for 5th Division
CHIEF CLERK CLERICAL FORCE ESTIMATES STATISTICS ETC
3 STENOGRAPHERS
RESIDENT ENGINEER DEPT PLANS
LEVELLER
TRACER
DRAFTSMAN
Seven Assistant Engineers in charge of Seven Sections Construction, Maintenance & Town Highways
1 2 3 4 5 6 7
Highway Inspector
Leveller Rodman 2 Chainmen
3 Patrolmen
Three Maintenance Gangs Assigned by Division Engineer to Section.
1 2 3
MOTOR TRUCK FOREMAN-CHAUFFEUR 5 LABORERS
RECORDS
SECRETARY
REPORT CLERK
CONTRACT CLERK
2 STENOGRAPHERS
2 CLERKS
CORRESPONDENCE CLERK
3 STENOGRAPHERS
INFORMATION CLERK
STENOGRAPHER
FISCAL AFFAIRS
AUDITOR
TRAVELING AUDITOR
ACCOUNTANT
3 BOOK KEEPERS
CHIEF CLERK
REPORT CLERK
2 STENOGRAPHERS
FILE CLERK
BUDGET CLERK

CHART SHOWING THE PROPOSED ADMINISTRATIVE ORGANIZATION OF THE NEW YORK COMMISSION OF HIGHWAYS AS SET FORTH IN THE REPORT OF THE BOARD OF CONSULTING ENGINEERS, CONSISTING OF GEORGE C. DIEHL, HAROLD PARKER AND WILLIAM DE H. WASHINGTON.

upkeep should be allowed for and a balance reserved for resurfacing or substantial improvement at the end of a period of years

Other plans have been suggested but all require complication of accounting based upon doubtful premises and large initial appropriations of money. The present plan of annual appropriations based upon estimated costs and taken directly from annual revenue seems, at all events for the present, the best

The specifications for such work and the charge of the execution thereof, should be directly under supervision of the division engineer in each division, precisely the same as specifications and contracts are made and executed in original construction already recommended.

The supervision of town highways and the inspection of town reports and records can be done more conveniently and satisfactorily by an assistant engineer under the direction and control of the division engineer than by the present method, according to the report. Placing this work under the control of the division engineer would insure uniform practice and standard methods, coordinating town work with state and county work.

In regard to bridges the report states that the present method of approval of bridge plans by both the state and county highway officials "causes delay, is unwieldy and cumbersome without corresponding benefits." The board holds that the plans should be approved by either a county or a state official and not by both, and that this approval should preferably be by the county official since the county may share in the expense and since such a course would permit town officials to consult with the county authorities. It is also recommended that where the county superintendent might not be able to pass upon a complicated bridge structure without outside help he should have the right to seek advice from the division engineer in charge.

The matter of road signs is given considerable attention in the report, and uniform concrete or stone mileposts, small concrete markers at each tenth of a mile and three classes of elevated signs are recommended. These three classes, as outlined in the report, would be distance and direction signs, police and warning signs and warning symbols, each class being so far as possible uniform in material, size, form, color, height, distance from the edge of the road and location with respect to the indicated topographical features. Detailed suggestions are also made as to the inscriptions on the signs.

Considerable attention is given by the board to the matter of reports, a summary of the various reports to be made by the several officers and employees being indicated in a general way. A few of the recommended reports included in the outline prepared by the board are as follows: Daily reports to the division engineer by assistant engineers in charge of sections or survey parties, to assistant engineers by highway inspectors and by patrolmen, to division engineers and section engineers by maintenance gangs and to the chief engineer by the test and research bureau. In addition to these, provision is made for monthly reports by most of the officers to their immediate superiors, and in most cases weekly reports. Annual reports are provided for by the division engineers to the chief engineer, by the chief engineer to the commissioner and by the auditor to the commissioner, or the legislature or for publication. It is recommended that the commissioner report to the governor every three months and annually to the Legislature.

A recommended order of procedure to be followed in the construction of a county highway is given in detail in the report and is illustrated by a chart showing graphically the various steps from the preliminary resolution addressed to the state highway commissioner by the board of county supervisors to the final payment to the contractor.

A little over a page of the report is given to the discussion of the geological distribution of road material over the state. This consists principally of a table dividing the state up into geological provinces and showing the location of each province, the formation prevailing in it and the road material occurring in it.

The conclusion of the report contains a series of specific recommendations, which are as follows:

(a) The highway law be amended to provide for the organization as herein described.

(b) A board be created to consider and report upon appropriate state and county road systems, and methods of financing them.

(c) Statistics be compiled, including traffic census and cost data, and continued tests be made to determine the most effective and economical forms of construction under the widely varying conditions.

(d) Complete records of all employees kept in order that the most efficient organiaztion can be soonest perfected.

(e) All state and county highways be signposted.

(f) Dangerous curves on state and county highways be widened and suitably banked.

(g) Old road surfaces be utilized for foundations, as far as practicable.

(h) The greatest care be exercised in the selection of materials and by thorough workmanship to secure good construction.

(i) Construction, maintenance and town highway work be consolidated.

(j) The engineering or construction department be made permanent and kept free from politics, and be required to pass upon technical matters only.

(k) The commissioner through consulting engineers be kept fully in touch with construction work and be informed of the most advanced methods in use in other states and countries.

(l) The commissioner prescribe regulations limiting the size, width and weight of vehicles, and governing the width and character of tires.

(m) Immediate reports be made on the condition of all completed state and county highways and estimates made of the cost of the reconstruction, repair and maintenance of each.

Motor Travel in Alaska

During the past summer United States Army engineers made a trip by motor truck from Valdez on Prince William Sound northerly through that portion of Alaska known as the Mount McKinley District to Fairbanks on the Tanana River. While the trip was undertaken principally to ascertain the possibility and practicability of motor transportation in the territory, the engineers at the same time laid out a route by which it is estimated that the time required to reach the interior towns, especially those on the Upper Yukon and the Tanana Rivers, will be materially reduced.

The start was made from Valdez on July 28 with a White truck carrying a load of supplies and considerable mail for camps along the military telegraph line. After crossing the delta of the Valdez glacier the route led for 14 miles through the Keystone Canyon, where the road was bordered with walls of rock and ice rising nearly a thousand feet above Lowe River, a glacier stream running through the canyon. The road or trail is built along cliffs, and is very narrow and in many places is blasted out of solid rock. The first night was spent at a camp known as Workman's. The next day the party commenced the ascent of the Chugach Mountains over a trail extending for 25½ miles to the summit at Thompson's Pass, where the elevation is 3,000 ft. After descending the other side of the mountains the route led across another delta region, where several glacier streams were forded, and finally led to a camp at Beaver Dam. The next three days were spent on trails opened during the last three years by the Board of Road Commissioners of Alaska in the deltas of the Copper and Gulkana Rivers. Roads in this region include many corduroy trails built of scrub timber which are extremely rough and narrow and do not permit of rapid progress.

From Beaver Dam northerly through the Copper River Valley to the fork of the Gulkana River the engineers encountered the most difficult part of their trip. The military trail passes over a low and marshy country and was covered alternately with ice and glacier mud. In the worst places it was necessary to wrap the wheels of the truck with

ALASKAN TRAIL NEAR UPPER GULKANA LAKE.

rope, and for an entire afternoon the machine was operated on low gear. On this portion of the road the crew was obliged to cut down trees and blast out stumps, rocks and ice in many places.

The next three days of travel brought the party to Paxton on the Gulkana River in the foothills of the Alaskan Range. The trail led over the sides of mountains through a lake country where, according to the engineers, the grades averaged only 6 per cent., although in many places it was necessary to climb a 16 per cent. grade over a rough ice surface. On this part of the trip the wheels of the motor truck were wound with steel cable to prevent skidding and sliding off the cliffs. Frequent small washouts, caused by the melting of glaciers, were met, and at several points the grades were so steep and the curves so sharp that it was necessary to reverse the car to negotiate the turns. After reaching the summit the trail became less difficult, requiring little except frequent inspection of the road for considerable distances ahead before proceeding with the truck. After descending the mountains the party reached the valley of the Delta River and camped on the Guncreek flats, which are composed almost entirely of glacier mud and quicksand.

After leaving the flats the character of the country changed, the marshes being succeeded by rough country where large boulders made traveling extremely difficult. At Donnelly the party came to a road with a clay and gravel surface on a fairly good foundation, which continued for 90 miles over a rugged country where there were many steep grades but very little snow or ice. Reaching the Tanana River the truck was taken across to McCarty by ferry, and the party then drove along the north bank of the river to Munson's. On the ninth day, after covering 379 miles, the party reached the end of the journey at Fairbanks, the head of navigation on the Tanana River and two degrees from the Arctic Circle.

MILITARY TELEGRAPH TRAIL IN THE GULKANA RIVER DELTA.

After spending three days at Fairbanks preparing for the return trip, the party started back with Lieutenant-Colonel W. P. Richardson, President of the Board of Road Commissioners of Alaska, in charge, and with Lieutenant Glen E. Edgerton, Engineer Officer of the board, and other officers and engineers as members. The truck left Fairbanks on Aug. 9 and made the return journey following as closely as possible the route taken on the way up. Three days of rain had made traveling difficult and in many places had practically destroyed the trail. At Willow Creek, 26 miles south of Gulkana, a detour was made to Chitina, by which 68 miles were added to the journey and the return trip lengthened to 10 days. In one place it was necessary to cut a trail for 500 yards through the woods in order to avoid a bad washout caused by a stream from a melting glacier, and in another place a bridge, 12 ft. above the water at the time the truck crossed it on the outbound trip, had been carried away by floods and it was necessary to cut a path through the woods to a suitable fording place. When the party reached Keystone Canyon, they found that the trail had been washed away in many places and it was necessary for the crew to fill in gulches with stone before the car could continue.

THE ROAD ON THE CHITINA DETOUR.

The trip was finished on Aug. 19 after having covered a distance of 826 miles in 19 days. Lieutenant-Colonel Richardson is said to have stated that he believed the road work contemplated by the Board of Road Commissioners next summer will make it possible to go from Valdez to Fairbanks in 4 days.

The Date of the Bond Elections in San Bernardino and Riverside Counties, Cal., has been changed from Dec. 16 to Dec. 17. The reason for the change is the fact that Dec. 16 is the date on which Riverside County is to vote on amendments to its charter and bonds cannot legally be voted at an election held for any other purpose. San Bernardino County will vote on bonds to the amount of $1,500,000, and Riverside County to the amount of $1,000,000, both sums to be spent in highway improvement.

Robert R. Young, State Treasurer of Pennsylvania, has issued a statement to the effect that notwithstanding the failure of the voters at the recent election to endorse the proposed $50,000,000 bond issue for highway improvement, there are still sufficient funds available to carry on extensive work along that line. Mr. Young states that the sum of $5,000,000 per year can be expended on the highways of the state, if the State Legislature sees fit to divert certain appropriations to that purpose.

National or Federal Aid

By MAJOR W. W. CROSBY*

In considering the matter of federal aid to highway improvement, the writer has, for a considerable period, surveyed the facts as he was able to perceive them and has arrived at, or approached, certain conclusions. Stated as such they may be interesting in connection with the writer's article "The Question of Federal Aid," which appeared in "Good Roads" of Nov. 1, 1913.

The writer believes that while it may be said that the national government is theoretically interested in all of the public roads and even those likely to become such within a reasonable time, its interest to the extent of financial aid thereon is limited to only a percentage of the total present mileage and that, therefore, some selection of the roads to receive national funds toward their improvement is correct in theory and should be provided for. Whether this selection shall take the form of a few "coast-to-coast" routes, or of "55,000 miles of national highways," or of a less definite arrangement, will, of course, depend upon the results of the investigation urged in the preceding article.

In order to avoid giving encouragement to a relaxation on the part of local authorities already making the effort to improve their roads and to avoid discouraging others from beginning such work, it might be wise to lay down, before beginning actual construction under the act, some system of roads, and to have it distinctly understood that the routes therein embraced are the only ones on which federal aid can be expected for the near future at least. The advantage of thus having, before the discussion of the multitude of dependent points sure to follow, a concrete starting point or base would not be inconsiderable, as will probably be evident to the reader.

In the selection of such a system, the writer feels that while the effort might be made to connect important points and state capitals, the general nature of the scheme forbids undue consideration of concentration of population, of valuation or taxpaying bases, of state lines or of state road mileage. Such considerations can be given their dues better by proper provisions in the character or quality of the construction to be done later.

It may be doubtful if the majority of those clamoring for federal aid will be satisfied with the improvement of the trunk lines alone and it seems to the writer that the completion of such trunk lines is an ultimate, rather than an early, end to be striven for. Perfect highways for transcontinental or even interstate tours do not seem to be the first need of the country in this matter.

The amount of aid or proportion of the cost to be paid from the national treasury must be sufficient to insure the accomplishment of the ends for which it is provided and the figure in any case seems to lie between two fairly definite limits. Just what these are can be deduced from the previous experiences of the states themselves. If aid in too small a proportion of the cost is offered, the work will not proceed because the local authorities feel that the aid does not meet the extra cost of doing the work so as to meet the approval of the higher authority beyond what would be the cost of doing it in a way to satisfy the local authority. On the other hand, if the aid offered is too large, not only are the interests of the higher authority extravagantly satisfied, but also the temptation is offered the local authorities to move for aid on those roads which are not of material interest to the nation. From the immediately foregoing can be inferred at least one reason why the writer confines his present consideration to federal aid and has dismissed from this article any extended reference to national roads built solely by the government.

Successful results have been obtained under state aid laws where the aid offered by the state ranged from one-third to two-thirds of the cost of construction. In the case of a federal aid law, the writer believes that at the beginning 50 per cent. of the net cost of construction would be a fair proportion to be offered.

As to the conditions under which aid should be offered, the writer believes that the general principle that whenever a higher authority assists a lower one financially, the results should be satisfactory to the former, and, therefore, that the national government should establish standards to which the results should come in order to secure the aid. These standards properly established by competent representatives of the government should give due consideration to local interest, resources, etc., and thus, as before referred to, equalize to some extent at least the apparent unfairness of neglect of such considerations as suggested in the selection of the system itself.

In any scheme of federal aid now to be adopted, recognition must be had of the work already done by certain progressive states which would, with possibly slight alterations or extensions, fit into any system of national highways laid down. It would not only be unfair to those states to neglect to provide them with the opportunity for fair compensation toward their expenditures, but also any such neglect would react to check their future work and to deter other states from going ahead on the lines that have so far been most successful, at least locally. Further, in this connection, it might be wise to include in the act some provision tending to spur the sluggish states on and to encourage the greatest early benefit of the act by, for instance, providing annual allotments of the appropriation for each state and for the loss of their allotments to the backward states to the benefit of the more progressive ones.

No act providing for road construction or improvement should now be passed without including sufficient provision for the proper maintenance of the completed work. Again the writer believes the work of maintenance should devolve on the local authorities subject to the approval of the government and that unquestionably the latter should have ample means for compelling, when necessary, proper action by the former.

In the framing of any bill of as broad a nature as a federal aid to highways act, considerations of its incidental effect must not be neglected, and hence highway engineering may be properly reviewed in this connection. Its science has been but recently uncovered and its art as yet but slightly developed. It is generally agreed that there is considerable future for both. Nothing should be done now to restrict such futures. The individual should not, any more than the locality as before suggested, be discouraged or the possible rewards to his ambitions be reduced by limiting his career upward to a subordinate position in a vast government department. As long as state lines exist, the governorship of a state, for instance, will seem a higher position than the collectorship of a port. Again, in the present condition of highway engineering and the study of the facts underlying federal aid, due recognition must be given to the vastness of this country of ours; of the immense distances, both as to miles and hours, between its various sections or of such from its capital; of the astonishingly great variety of soil, climate, local laws, customs, etc., and it must be remembered that useful knowledge possessed or attained at the headquarters of too massive an organization is usually lost through the channels it has to descend and is thus infrequently fully applied in practice. Also it should be remembered that human capabilities for acquiring familiarity with all the minutiae of this variety are limited, and that great experts, whether they be technical or executive are seldom available for government offices at the salaries usually accompanying such positions, even if political conditions should permit their selection.

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Any act of this character should be, of course, as concise as possible and sufficiently comprehensive for its purposes. It should not, however, go into too great detail in matters which can be best left to its administrators to settle, because the desirable flexibility is thereby reduced or lost. Further, a reasonable amount of responsibility and freedom of action will most likely develop the greatest enthusiasm and energy among its administrators. In framing such a bill, the writer feels it will be best merely to outline the policy to be followed under it, to place certain duties and limits of action for the administration of it, to provide for specific administrators, and to give power to (and make responsible) the latter for decisions on all the details under them, at least until arising situations prove the need of further legislation.

The writer believes that through a national road board of moderate size, selected without regard to politics, would be the ideal way to administer a federal aid law. There may, however, be difficulties in securing this ideal now, and there are undoubtedly other ways of making a fairly good start in the matter. He later suggests one at least in his proposed bill. The main points to be kept in mind in this connection are those above discussed.

The federal aided highways have been limited in the foregoing consideration, and it is surely desirable to give a thought to the rest of the total of 2,200,000 miles. It has been said that the example of government built roads will prove a powerful factor in the bettering of all the other roads and the writer would be the last to refuse to admit the principle. But he submits that such influence is always much stronger when the local authorities take part in the work of, and are directly responsible for producing the "examples" than when such are merely set before them.

The last remark above applies with particular force to the consideration of maintenance, and it was with this in mind that the writer before stated that the maintenance, as well as the construction, should be performed by the local authorities. Proper maintenance of roads is secured only by faithful, persistent drudgery and care. It lacks the spectacular and is best performed by men with strong local interests who naturally are neat, painstaking, methodical and faithfully persevering.

In illustration of the writer's conclusions, he submits below what to him seems a desirable bill for federal aid. This bill, or its counterpart, has been introduced in the United States Senate by Senator W. P. Jackson of Maryland, and the writer hopes that it may receive careful consideration.

The writer believes a summary of its advantages may be made as follows:

The bill provides for the selection of a system of national highways, not specifically, but in effect through the decisions of a board as to the propriety of federal aid in response to applications therefor, and the restriction of aid to those highways felt to be of sufficient importance nationally to warrant it.

It encourages local interest in the matter and the development of local road authorities; encourages local pride and capability in road work; provides for setting examples for local imitation; encourages professional and personal development in highway engineering by leaving open, as rewards for personal progress to ambitious engineers, the positions in state highway departments with their attractive individuality and prestige.

It provides a fair amount of financial aid for the improvement of roads on national lines, and probably a proportion which would in most all cases insure work being at once begun and carried on.

It gives the national authorities ample control to protect the government's interests in the work.

It does not discriminate against those states which have already gone ahead with their road improvement, but, on the contrary, provides for their reimbursement on equal lines with all others.

It spurs on the states now hesitating in the matter and offers reward to those more progressive.

It provides for proper maintenance.

It is concise and clear, yet sufficiently comprehensive to meet the present needs.

It permits sufficient flexibility.

It permits every advantage to be taken of existing machinery and in no way seriously interferes therewith. That is, the Office of Public Roads, for instance, would not be disturbed in its investigative and advisory capacities for which it was created, and the state highway commissions doing good work would be encouraged and supported but not abolished or interfered with.

It avoids the creation of an enormous and probably expensive and inefficient government road department with all the ills incident thereto. In this connection, certain extracts from the discussion by the general reporter of the Third International Road Congress (London, 1913,) on the eighth question—"Authorities in Charge of the Construction and Maintenance of Roads—Functions of Central Authorities and Local Authorities"—may be interesting. Mr. W. Rees Jeffreys, Secretary to the British Road Board, says the arguments against centralization may be summarized as follows:

1. Centralization introduces too much officialism;
2. A central authority does not possess local knowledge or take proper notice of local sentiment and feeling;
3. Centralization secures uniformity at too dear a price;
4. Centralization leads (in some cases) to two authorities exercising jurisdiction over one area, and,
5. The cry for centralization comes from the users of the roads who are not local ratepayers.

He then proceeds to discuss these points in extenso, and while space will not permit the repetition of the matter here, it will be well worth the while of those interested to read the remarks both of Mr. Jeffreys and Mr. Harris (General Reporter on the Ninth Question—"Finance of the Construction and Upkeep of Roads") together with the conclusions of the congress in this connection.

It provides a form of organization for carrying funds from the national treasury to the roads themselves which should insure the least waste of such funds in transit and which seems to be best fitted to the present situation as regards the political and social conditions of this country, human capabilities, and the science and art of highway engineering.

A Federal Aid Bill

Whereas, The establishment and the proper maintenance of a general system of main post roads and highways are not only desirable, but are also necessities for the welfare of the people of this country and for its proper development, therefore be it enacted that:

Section 1. Whenever any state shall have completed, to the satisfaction of the Secretary of Agriculture, not less than a mile of modern road, on a route approved for the purpose in writing by the Postmaster General, and the said Secretary of Agriculture shall so signify his approval in writing, and a duly certified statement in detail of the methods and costs of said improved road shall be presented to the Treasurer of the United States, together with the approvals hereinbefore mentioned of the Secretary of Agriculture and of the Postmaster General, by the state highway commission of any state, the Treasurer of the United States shall thereupon pay to the state highway commission in question one-half the cost of said improved road; provided,

(a) That no payment shall be made in excess of the rate of $5,000 per mile for the half cost mentioned.

(b) That in calculating the cost referred to, no account of, nor allowance for, expenditures for rights of way, property damages, or royalties, patents or copyrights shall be included.

Section 2. The term "road" used in this act shall be understood to include streets, avenues, and the necessary bridges of the same, but shall not include or embrace any road or way devoted exclusively to certain especial kinds or means of traffic.

Section 3. The Secretary of Agriculture, the Postmaster General, and the Treasurer of the United States shall each of them have full power to describe, by rules and regulations, the methods in detail to be followed by the states for the securing of their respective approvals, as provided in Section 1 of this act.

Section 4. The sum of ten million dollars ($10,000,000), or as much thereof as may be necessary, is hereby appropriated annually for the purpose of carrying out the provisions of this act; provided that,

(a) No state shall receive in any fiscal year a greater sum in the aggregate than such a proportion of ten million dollars ($10,000,000) as is equal to the ratio between the public roads of such state and the public roads of all the states according to the estimates of the Secretary of Agriculture.

(b) Any unused portion of the ten million dollars ($10,000,000) hereby appropriated for the fiscal year shall be returned to the treasury of the United States and shall lapse.

Section 5. Any road constructed or improved under the provisions of this act shall thereafter be known as a national road. The maintenance of such a road shall be performed by the state (or its agents) in which said road lies, and shall be done to the satisfaction of the Secretary of Agriculture. The said Secretary of Agriculture is hereby empowered to issue, from time to time, such rules and regulations concerning this maintenance as in his judgment may be desirable in the premises.

Section 6. If, at any time, the Secretary of Agriculture shall certify in writing to the Treasurer of the United States that, in the opinion of said Secretary of Agriculture, the condition of any road built or improved under this act is not satisfactory or not being properly maintained by the state in which said road may lie, then the said Treasurer of the United States shall refuse to pay, and shall not pay to such state any further sum or sums to said state under the provisions of this act until said Treasurer shall be further notified in writing by said Secretary of Agriculture that the unsatisfactory condition or improper maintenance, certified to as above by said Secretary of Agriculture, has been satisfactorily remedied in the opinion of said Secretary of Agriculture.

Section 7. This act shall take effect when approved.

"Good Roads Day" in Travis County, Texas.

"Good Roads Day" in Travis County, Texas, was observed on November 14 by the construction of two miles of public highway near the city of Austin by business men, city officials, school boys and boy scouts.

The day was originally planned for Nov. 5, which was one of the days set aside by the governor for the construction and repair of highways in all parts of the state. On that day, however, there were heavy rains throughout Texas, with the result that the work was postponed.

GOVERNOR COLQUITT PLOWING AND PRESIDENT MEZES OF THE UNIVERSITY OF TEXAS LOADING GRAVEL.

The road improved is one leading from the city limits of Austin to the town of Fiskville. The road was graded, ditches were dug and gravel was spread over the roadway and rolled. At the gravel pit Governor O. B. Colquitt guided a plow, while President S. E. Mezes of the University of Texas loaded gravel into a wagon with the assistance of Mayor A. P. Wooldridge. After the first wagon was loaded the governor drove it to the work, where the gravel was spread by a force consisting of the city commissioners of Austin. Although Governor Colquitt and President Mezes were able to spend only the forenoon on the work the city commissioners remained all day, as did many other volunteer laborers. At noon a barbecue was held in a grove near the work, after which work was resumed and was continued throughout the afternoon, the places of those who were able to spend only the forenoon being taken by others who had been unable to get away from business earlier in the day.

According to reports, 600 citizens worked on the road during the day and accomplished work the value of which is estimated at about $5,000. It is stated, however, that the money value of the work done is regarded as of much less importance than the sentiment aroused for good roads.

AUSTIN CITY COMMISSIONERS SPREADING GRAVEL ON ROAD BETWEEN AUSTIN AND FISKVILLE.

BODY OF BOY SCOUTS FROM AUSTIN WORKING AT DITCH DIGGING.

Bituminous Construction.*

By S. D. FOSTER.†

The subject of bituminous construction, the one upon which I have been invited to speak, is such a broad one, and one upon which so much has been said and written, that I will not attempt to discuss its merits, compare it with other types of pavements, or take up the correct method of maintenance after construction; but will deal entirely with the two types of construction most commonly used by engineers today, viz, the bituminous road constructed by the penetration method, and the bituminous road constructed by the mixing method.

Speaking generally of the two methods of construction, and taking into account the hundreds of miles of bituminous roads already constructed, I feel safe in saying that there is probably no other type of construction about which there is less absolute information concerning the physical and chemical characteristics of the bituminous materials and the road metals which will bring about the best results. There is no type of road construction which requires more care or more consistent expert supervision and inspection than that involved in the use of bituminous material, and, until such time as we are able to thoroughly educate and instruct efficient and capable engineers and inspectors in this type of construction, the same will remain in an experimental stage. In general, also, I would state that the preparation of the subgrade, the drainage, and the foundation are extremely important factors in the success of bituminous pavements, and, unless properly constructed, will bring about their destruction. I might state at this time that, to my mind, the experimental stage in foundation work has been passed, and, that for the ordinary country traffic to which the average highways must be subjected, an 8-in. telford foundation, or a 5-in. cement concrete foundation, when properly constructed, is sufficient for the carrying of any class of pavement which we may desire to place thereon.

Presuming that the foundation has been properly completed, I do not believe that I can better describe the method of building thereon a bituminous penetration pavement than by quoting from the Pennsylvania State Highway Department's specifications, to wit:

> Upon a suitable foundation there shall be spread a layer of broken stone of such quality as may be suitable. The stone shall be broken in fairly uniform and regular cubes, free from dirt or dust, and comparatively free from flakes or splinters. The stone shall be of such size that they will pass a 1½-in. circular opening and over a ¾-in. circular opening. This layer of stone shall be of such thickness that, when it has been rolled with at least a 10-ton, power macadam roller, it shall have a thickness of 3 ins.
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> The surface must be firm and, when completed, correspond to the grade in proper crown of cross section. Upon each square yard of this surface shall be evenly spread, by means of an approved pressure distributor or fan-spout sprinkling pot, from 1½ to 1¾ gals. of bituminous material, of a penetration from 90 to 120.
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> The bituminous material shall be heated to a temperature of approximately 350° F. Immediately thereafter, sufficient dry, dustless screenings, passing a ½-in. screen, shall be spread in sufficient quantities to evenly cover the entire surface of the road and take up excess bituminous material. The road shall then be rolled until firm and a smooth surface results and conforms to the longitudinal and transverse section.
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> While the surface is clean and warm, a seal coat of bituminous material of proper consistency to be flexible when cold, shall be spread ½ gal. to the square yard. It shall be applied while at a temperature of 350° F., and, while the bituminous material is in a liquid state, there must be spread a top dressing of clean, dry, torpedo sand, or dustless stone chips, in sufficient quantities to cover the entire surface of the road and take up any excess bituminous material.
>
> Immediately thereafter, the road shall again be thoroughly rolled; if so directed, the stone, stone chips, and sand must be heated. In rolling, the roller should start from the side line and work toward the center, and, in all cases, continued until thorough compression is secured.

By following these instructions, a first-class penetration pavement can be constructed, but, in the experience of the department, the engineer has continually occurring the several conditions which I am about to enumerate, any one of which, escaping his attention, will be bound to produce a weak spot in the pavement. The first of these conditions is the presence of water in the foundation, due either to wet weather springs, or to rainfall after the foundation has been placed. This condition results in water working up through the telford stone and thence through the stone comprising the aggregate of the pavement. It attacks the bituminous material which, losing its binding powers, readily disintegrates the pavement. Another condition, often occurring, is due to the contractor not napping his telford properly and attempting to bring the same to the proper crown and cross section by the use of stone spalls. These cannot be thoroughly rolled into the foundation, and when the stone which is to be treated with bituminous material is hauled on the road, the spalls continually work up through the smaller stone and produce weak places in the finished pavement.

The use of soft stone, especially in districts where local stone is used for road purposes, furnishes another problem for the engineer. Soft stone, when placed in the pavement and rolled, may seemingly be treated with bituminous material and thus cover up all cracks or fractures which may have been made by the initial rolling, but the rolling of the pavement, both after the first application of the bituminous material and by the final compacting of the same, will again fracture more or less of the stone aggregate. These fractures, occurring as they do after the application of the bituminous material, will be void of binding qualities and the stone will immediately start to break down through continued rubbing, one piece against the other. This, in itself, produces dust and allows the moisture to penetrate into the pavement, again causing destruction of the binding powers of bituminous material. In addition, this soft stone is readily worn away by passing vehicles and serves to shorten the life of a bituminous pavement.

Stone crushed in quarries, where there is an abundance of stripping or where there is a stratum of soft stone, or stone hauled upon the highway and allowed to stand for several days subject to clouds of dust from passing vehicles, becomes covered with a fine film of dust particles. Stone of this character, when placed in the road and subjected to the application of bituminous material, cannot be properly bonded, inasmuch as the bituminous material, while covering each stone, is unable to directly bond itself to the stone proper, for the dust layer covering the stone will act as a barrier, and, while the bituminous material will, or may, hold the stone in place in the pavement, it will not produce the proper bonding of one particle of the stone with another. Stone with a smooth non-porous surface will prove a failure on account of the inability of the bituminous material to adhere thereto. Wet or damp stones result, likewise, in the bituminous material not obtaining any adhesion. It is well also to avoid those classes of stone which do not crush in a cubical or near-cubical shape. Stones that break or crush in splinters will not take the compression and will not interlock themselves one with the other in the manner most desired in accomplishing first-class results.

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*Paper presented at the American Road Congress, Detroit, Mich., Sept. 29-Oct. 4, 1913.

†Chief Engineer, Pennsylvania State Highway Department.

The selection of a suitable binder is a most important matter, requiring skill and judgment. There is no one "best" product, and the selection must be governed by a number of conditions. The principal features to be considered in this connection are the characteristics of the stone to be used; the manner of applying the bituminous cement, whether the material is to be applied hot or cold, by means of distributors with or without pressure, or by pouring pots; the quantity and character of traffic to which the road will be subjected; climatic conditions; the cost of bituminous material, and the probable cost of application.

Inasmuch as the results to be obtained are the securing of a compact, uniformly solid paving surface impervious to water, it is obvious that continued and experienced supervision and exceptional care should be employed. Equally important with the selection of the bituminous material is the care with which it must be heated, as the slighest overheating will burn the product and render it unfit as a binder. It has been my experience that no successful results can be accomplished unless the inspector keeps continually with him on the work a thermometer with which to test the temperature to which the bituminous cement is being subjected. Another frequent failure occurs through lack of uniformity in the quantity of bituminous material applied to the stone and is caused by crude or careless applications, and cannot bring about proper results. The hand pouring should be supplanted by suitable mechanical distributors which will apply the bituminous cements under pressure and insure thorough penetration and a more even application.

In enumerating the various mistakes which so often occur in penetration work, I would say that the cause of failures can be readily traced in many instances to faulty plans and specifications, lack of care and judgment in the selection of materials, poor and inadequate equipment with which to carry on the work, inexperienced labor for both skilled and unskilled service, continuation of work during unseasonable or inclement weather, and insufficient funds to expedite the work under way. I might say in passing that probably the most noticeable cause of failure is that a class of incompetent contractors, having absolutely no experience in bituminous construction, bid on highway work and look to the engineering department as a school of instruction for their guidance.

As to what the life of a bituminous penetration pavement will be, time alone can tell, as the body of such a road contains a mass of material that is not evenly, properly, or finely graded. Both coarse and fine sections exist, permitting an application of the bituminous binder either in excess or deficiency; and, possibly, in some instances, only a light seal application is secured. While this condition does not exist generally, I must acknowledge that it is there, and I feel that wherever this method of construction has been, or is being, followed, it is only a question of time until the weak places show signs of disintegration. These, of course, can be repaired by an efficient maintenance force, and upon this maintenance force the probable length of life of this type of pavement depends. Where this class of pavement is supervised under the most expert management, the results at best are only those of a surface character and produce a road that for the time being seems to give satisfactory results.

Bituminous concrete pavements, constructed by the mixing together of stone, sand, and bituminous cement, in mechanical mixers, reduce the chance of failure to the minimum and eliminate many of the causes of failure found in penetration construction.

It is not necessary for me to discuss here the material, its size, quality, or character, or to explain in detail how this mixture is secured, as the average engineer is well acquainted with this type of pavement, inasmuch as it is very similiar to the mixtures used in all the large cities for street purposes. While the best results from this type of pavement are obtained by using a cement concrete foundation, it is not absolutely necessary that such a foundation be used, as experience has demonstrated that water bound macadam roads, where they have been properly drained, can be resurfaced with a mechanical mixture, and the results therefrom compare favorably with those of sheet asphalt streets. This type of construction has been a success and I feel safe in saying that most of the old water bound macadam roads that have been torn by the heavy traffic can readily be brought to grade, properly crowned, made firm, and covered with a bituminous concrete that will be economical and serviceable for many years.

I do not believe very much in the use of telford foundation for a mechanically-mixed surface, as it is almost impossible to obtain, upon a telford foundation, a surface that will not be more or less wavy, and we all know that bituminously constructed pavements which have a wavy surface are soon doomed to destruction. In the construction of this type of pavement, there are a few points which must be closely watched. The first—and to my mind the most important—is the mixture produced by the majority of mixers at present in use. There is a tendency in all revolving mixers to bring the large stone together and, unless in the dumping of the mixer this is closely watched, the purpose of mixing—which is that of having the aggregate of different sizes so mixed as to give the lowest percentage of voids—will be defeated. This condition will again arise if the material has to be transported a very great distance from the mixer to the road, as there will be a tendency for the larger stone to work toward the top of the load and the smaller material toward the bottom. So it is important in placing the material in the pavement that it should first be dumped upon a platform and from there shoveled into place in as uniform a mixture as possible.

I have used two distinct types of mixed bituminous construction. In one of these there was used a cut-back bituminous material which remained in a plastic state for several days after being placed on the road, thereby bringing about a continuous bonding process, by means of local traffic passing over the road. The result of this was to bring about a perfectly smooth and uniform surface, in which there was probably from 70 to 80 per cent. of mineral aggregate exposed, which furnished traction for horses' shoes and automobile tires, thus eliminating one of the great criticisms of this type of pavement. In the other there was used a straight bituminous material of approximately 60 to 70 penetration, upon which a seal coat was used to bring about a smooth and compact surface.

Care should be exercised in determining the sizes of stone for the type of pavement which is to be constructed. From experience, I do not believe it wise to use any stone larger than that which will pass through a 1-in. ring in the construction of a pavement upon a cement concrete foundation, inasmuch as, in this type of pavement, while the load is seemingly carried upon the surface, it is in reality carried directly upon the foundation, and, if stone larger than one inch in size is used, there will be a likelihood of the larger stone occurring directly upon one another, thus throwing open the chance of fracture to either or both stones by impact from horses' shoes, or weight from the tires of heavily loaded wagons.

Another point that does not favor the larger stone lies in the fact that sooner or later the stone is exposed in the surface in its largest diameter, again placing it in a position to be fractured by traffic. When such fracture occurs, unless the pavement is treated from time to time with light applications of bituminous cement, it opens the way for moisture to enter the pavement and thus destroy the binding quality of the bituminous material.

Where ordinary care has been taken in the construction of mixed bituminous pavements which have come under my observation, the results obtained fully warrant a continuation of this kind of construction, and I believe that the time is not far distant when the experimental stages of these pavements will be a feature of the past, providing explicit specifications are drawn to plainly designate the quality of all bituminous and other material desired in each individual job, and the old practice of copying specifications and methods in use elsewhere, regardless of local conditions such as drainage, sub-base, and traffic, is discontinued; and providing we are successful in properly educating highway engineers, inspectors, contractors, and the forces, both skilled and otherwise, in connection with the use of all materials that enter into the construction of this class of paving. And I consider that in the very near future there will be little distinction between the general specifications that designate the construction of highway pavements and those that designate the construction of city streets, inasmuch as the automobile and automobile truck—which are the most dangerous factors in the destruction of the average pavement—will traverse the city street and the country road in equal numbers.

The Labor Problem in Road Construction.[*]

By P. St. J. WILSON.[†]

Most of the problems in connection with labor in road work are identical with those in other similar work, and are familiar to all who are accustomed to handling labor. I, therefore, feel that I can be of little service in laying before you my troubles in this connection, having only a partial suggestion as to the remedy.

Road work, in order to get the best results, requires a certain amount of skilled labor, and also a certain amount of skill in all the labor used. The men who cut the ditches, shape the roadbed and do almost any other work, can materially aid the progress by doing skillfully the work to which they are assigned. The real labor problem, as I have found it, is to secure regularly the amount of skilled and common labor necessary to carry on the work economically. My case is probably an extreme one. In Virginia most of our work has been remote from the cities, in sparsely settled communities, where there are few laborers without more or less regular employment; yet the work is so scattered that many of the pieces are too small to justify importing laborers from any considerable distance and making provision for their maintenance. We have, therefore, been compelled to rely largely on local labor, and are often seriously handicapped. Not infrequently has it happened that we have been compelled to shut down work for a month or more during the best road building season, while the labor went to harvest the crops in the neighborhood.

When you are told that our joint state and county fund in a few counties is as small as $1,200 per year (ranging from this up to about $20,000), it may readily be seen how little work can be done in some places. In a number of instances, where the amount of work was sufficient to justify the importation of labor, parties in the neighborhood, even farmers interested in the road, have taken the labor away by offering higher wages than we were justified in meeting, considering the price of labor locally and generally throughout the state. With us there are few contractors equipped for road work, and although we always advertise for bids on our work we often have no bids at all, and still more frequently the bids are so high that we are forced to reject them. The consequence is that much work is done directly by the commission. During last August 130 pieces of work were under way at the same time, scattered over 60 counties, and only 28 of this number were under contract. To supply the necessary number of competent foremen and operatives, as well as laborers for these various pieces of work, has been probably the most difficult task we have had to contend with. On account of the small amount of funds available, many of the jobs last only a few months, the majority not continuing through the usual outdoor working season, which in our state is from eight to ten months, and but few of them last throughout the year. Where the work is of short duration, we, of course, so far as practicable, use one organization on two or more pieces of construction, but, notwithstanding this, we are forced to the necessity, to a certain extent, of reorganizing our forces each year. We endeavor, as far as possible, by transferring the best men to the longest jobs, to keep a nucleus of foremen and operators from year to year. Sometimes, where it is practicable, we use the county superintendents as foremen in our state work, but it is generally the case that these men are occupied with the county work at the time that we could use them.

As to the common labor, we have found it necessary to practically build up a new force annually in each county, though we frequently get back some of the local men we have used the year before.

This is, in brief, the labor situation as we have it in Virginia today, and there are doubtless other states contending with more or less similar conditions. The final solution of the problem has not been found by us. As to what we may call the skilled labor, time has helped us much and we have a certain number of trained foremen and operatives which is increasing from year to year and which will in time, I hope, be sufficient to meet the demand, notwithstanding the fact that we lose some of them every year on account of the irregularity of the work. But I must express the hope that in what has proven so far our nearest solution of the common labor problem we shall never have enough men to supply our demand—otherwise there must be a great increase in crime. So far as they are available, the convicts practically solve this problem for us. With them we have no pay-day drunks, no strikes—except now and then an escape—and many of the irregularities connected with the attendance of the free labor are avoided.

There are at work on the roads of Virginia about 1,500 convicts. They are divided into forces varying in numbers from 40 to 75, according to the class of work they are engaged in. Altogether, there are 27 of these forces, each in a different county. While we may have some labor problems with these, the chief one is eliminated on the work on which the convicts are placed, viz., that of keeping a sufficient amount of labor. We are better able to keep good foremen on these jobs also, because they are kept going all the year round.

While as a matter of economy we have to close down free labor work during the severe weather of winter, we find it economical to keep the convict work going on continuously, as the men have to be cared for whether at work or not. Certain classes of work can be found to be done in winter, such as quarrying and heavy rock grading in mountainous sections of the state, and in the lower sections where no stone is available the climate is milder and sufficient work can be done to justify the additional outlay for working when both men and teams have to be cared for in any event. In January of this year 72 per cent. of possible working days were made, while in July 90 per cent. were made. These percentages are based on an 8-hour day in January and a 10-hour day in July. Among the convicts we not infrequently find men capable of running steam rollers, engines, drills, etc., and a large percentage are made trusties and used as teamsters, messengers, etc.

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[*] Paper presented at the American Road Congress, Detroit, Mich., Sept. 29-Oct. 4, 1913.

[†] State Highway Commissioner of Virginia.

The average cost of the convict labor per 10-hour working day for the past three years has been 52 cts., as compared with wages ranging from $1.25 to $1.50 for free, common labor. To offset this discrepancy in cost to some extent, there are some disadvantages in working convicts, the chief one of which is the necessity of keeping them always immediately under the eye of the guard, thereby in a measure crippling their usefulness; sometimes, too, partially crippled men or semi-invalids are sentenced to the roads, which reduces the general efficiency of the force. Notwithstanding these handicaps, however, those foreman and contractors who have worked convicts under our system very generally express a preference for them over free labor, and I am satisfied they are fully 90 per cent. as efficient as the average hired labor. Recently we have had voluntary applications from three contractors for convict labor to be furnished to them and charged on their estimates at $1.00 per day per man, which is the established rate when this labor is used by contractors.

All felony convicts, not considered too dangerous, and all inmates of the jails are subject to duty in the state convict road force. This force is fed, clothed, guarded and transported at state expense and is furnished to the counties on the requisition of the State Highway Commissioner as one form of state aid, and is worked under the supervision and direction of the State Highway Commissioner. Under our statutes the convicts are at all times, whether working for contractors or otherwise, under the supervision and control of the state prison authorities, which insures the proper food and treatment and eliminates the possibility of the many cruelties which have been reported in connection with prison contracts in the past. The men are worked in the open, well fed and housed in sanitary quarters, with the result that they are greatly improved physically and capable of earning a living when discharged.

After a close study of this question and seven years. experience in the work, I am convinced that so far as they are available, the use of convicts in road work under conditions as we have them in Virginia, solves the problem of labor in road construction and also goes far towards solving the problem of what to do with our convicts.

Highway Engineering Instruction at Iowa State College.

Under the direction of the Iowa Highway Commission, Ames, Iowa, in cooperation with the engineering division of the Iowa State College, a short winter course in highway engineering will be given from Dec. 29 to Jan. 7, inclusive; also a short course in road making. These two courses are designed for entirely different purposes, the former for engineers and the latter for other road workers.

The object of the course in highway engineering, which will be a brief digest or exposition of the fundamental principles in the practice of highway engineering, will be to give engineers now engaged in road work, or allied lines, an opportunity to obtain a more intimate and thorough working knowledge of the subject. It is hoped that in this way the prestige of the profession may be more firmly established.

As the course is arranged primarily for those already launched in the engineering profession, few sessions of a nature to interest those with a merely superficial knowledge will be given. In addition to the stated lecture work, the engineers and specialists, all actively associated with highway engineering, will hold conferences at which engineers desirous of clearing up any point upon which they may be doubtful, or who wish to discuss specific problems, will be heard.

The first session will be held Monday evening, Dec. 29. The list of instructors includes exponents of the theoretical as well as the practical side of engineering. Among them are A. Marston, Chairman of the Iowa Highway Commission; A. R. Hirst, State Highway Engineer of Wisconsin; A. N. Johnson, State Highway Engineer of Illinois; T. H. MacDonald, State Engineer of Iowa; Lawrence I. Hewes, Chief of Economics and Maintenance, U. S. Office of Public Roads, Washington, D. C.; J. E. Kirkham, Associate Professor in Charge of Structural Engineering, Iowa State College; John E. Brindley, Professor of Economics, Iowa State College; John Coye, Chemist, Good Roads Section, Iowa Engineering Experimental Station; J. H. Ames, Office Engineer, Iowa Highway Commission; F. R. White, Field Engineer, Iowa Highway Commission; C. B. McCullough, Designing Engineer, Iowa Highway Commission, and T. R. Agg, Assistant Professor in Charge of Highway Engineering, Iowa State College.

Lectures on the construction and maintenance of roads and pavements, highway bridges and culverts, will be given. The various divisions of these subjects will be treated separately in morning and evening sessions. The program is as follows:

Roads and Pavements

First Week, Morning Sessions

Dec. 30—Surveys and preparation of plans—legal requirements; Dec. 31—Choice of type of construction and principles of design; Jan. 1—(A) Test of road building materials; (B) Sampling, testing and reproportioning gravel for concrete purposes; Jan. 2—Estimates and relative costs of various types of roads; Jan. 3—Specifications and contracts.

Second Week, Morning Sessions

Jan. 5—Cost keeping and accounting; Jan. 6—Organization of maintenance and construction forces; Jan. 7—Modern road making machinery and its uses.

Highway Bridges and Culverts

First Week, Afternoon Sessions

Highway bridges and culverts: Dec. 30—Surveys and preparation of plans—legal requirements; Dec. 31—Selection of type of bridge; Jan. 1—Design of steel highway bridges; Jan. 2—Design of concrete highways bridges; Jan. 3—Estimates of cost of highway bridges.

Second Week, Afternoon Sessions

Jan. 5—Specifications for highway bridges; Jan. 6—Paints for steel and preservatives for floor lumber; Jan. 7—Building culverts and bridges by day labor.

Special Evening Lectures

First Week

Dec. 29—Convocation; Dec. 30—Organization of a State Highway Department; Jan. 1—A comparative study of state road laws with special reference to the basic principles of the Iowa Road Law; Jan. 2—The Economics of Highway Improvement; Jan. 3—The practical operation of state aid.

Second Week

Jan. 5—Concrete roads (Illustrated); Jan. 6—Gravel and macadam roads (Illustrated); Jan. 7—Earth roads (Illustrated).

The course in road making, which will be held from Dec. 29 to Jan. 7, will be divided into ten periods. The daily lectures and discussions will be on the following topics: Organization of Forces for Road Construction; Organization of Forces for Dragging and Other Maintenance; Cost Keeping and Accounts; Use of Bue Prints and Grade Stakes; Earth Road Construction; Gravel Road Construction; Surface Drainage and Tile Drainage for Roads; Taxes for Road Purposes; Testing and Proportioning Gravel for Concrete; Road Machinery and Its Uses.

Citizens in the Vicinity of Langtry, Tex., are making efforts to change the route of the proposed San Antonio-El Paso Highway so that it will run from Del Rio across the Pecos Canyon to Langtry instead of by way of Ozona and Fort Stockton. It is stated that the change would make a much shorter route, and in addition would pass through a region possessing great scenic attractions.

AMERICAN ROAD BUILDERS' ASSOCIATION

150 NASSAU STREET
NEW YORK, N. Y.

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Through the courtesy of the publisher of "Good Roads," this page, each month, is devoted to the use of the American Road Builders' Association. It is solely in the interests of the Association, and it is the desire of the Executive Committee that all members feel that this space is their own, and that they contribute freely to it, not only as regards anything concerning the Association itself, but also that which will further the good roads movement. Besides the official announcements of the Association, there will appear on the page contributions by members, items of news concerning the Association activities and personal notes about its members. All contributions should be sent to the headquarters of the Association at 150 Nassau Street, New York, N. Y.

Executive Committee:
Geo. W. Tillson
R. A. Meeker
E. L. Powers

The Philadelphia Program

The program for the Tenth Annual Convention of the American Road Builders' Association, which will be held at the First Regiment Armory, Philadelphia, Pa., on Tuesday, Wednesday, Thursday and Friday of next week, is printed below. Although two or three minor changes may be made in those who are to take part in the discussions, the program as printed is final.

The sessions of the convention will be held in the smaller of the two drill rooms in the armory, the larger one being occupied by the exhibits. The public meeting on Thursday evening will be held in one of the large halls in the Hotel Bellevue-Stratford.

FIRST SESSION.

TUESDAY, DECEMBER 9, 10 A. M. TO 12 M.

Addresses of welcome. Response by Samuel Hill, President of the American Road Builders' Association.

SECOND SESSION.

TUESDAY, DECEMBER 9, 2 P. M.

Subject A.—Organization.

1. "Highway Officials, Their Duties and Powers."

   Paper: Col. E. A. Stevens, Commissioner, Department of public Roads of New Jersey.

   Discussion: F. W. Buffum, State Highway Commissioner of Missouri; A. N. Johnson, State Highway Engineer of Illinois; T. H. MacDonald, Highway Engineer, Iowa State Highway Commission; A. R. Hirst, State Highway Engineer of Wisconsin; Sidney Suggs, State Highway Commissioner of Oklahoma.

2. "Division of Expense, Responsibility and Authority Between Nation, State, County and Town."

   Paper: S. Percy Hooker, State Superintendent of Highways of New Hampshire.

   Discussion: Nelson P. Lewis, M. Am. Soc. C. E., Chief Engineer, Board of Estimate and Apportionment, New York, N. Y.; Harold Parker, M. Am. Soc. C. E., ex-Chairman Massachusetts Highway Commission; J. de Pulligny, Director of the French Mission of Engineers to the United States.

THIRD SESSION.

WEDNESDAY, DECEMBER 10, 10 A. M.

Subject A, continued

3. "The Relation to Each Other of the Contractor, Engineer and Inspector."

   Paper: F. L. Cranford, Road Contractor, Brooklyn, N. Y.

   Discussion: Major W. W. Crosby, M. Am. Soc. C. E., Chief Engineer Maryland Geological and Economic Survey and Consulting Engineer; H. W. Durham, M. Am. Soc. C. E., Chief Engineer, Bureau of Highways, Borough of Manhattan, New York, N. Y.; Fred E. Ellis, Manager Essex Trap Rock & Construction Co., Peabody, Mass.; G. S. Webster, M. Am. Soc. C. E., Chief, Bureau of Surveys, Philadelphia, Pa.; Wm. M. Acheson, Division Engineer, New York State Highway Commission.

4. "Details of Arrangements for Use of Convict Labor."

   Paper: Joseph Hyde Pratt, Ph. D., State Geologist of North Carolina.

   Discussion: P. St. J. Wilson, State Highway Commissioner of Virginia; C. M. Kerr, Assistant Engineer, State Highway Department, Louisiana; Dr. Frank Moore, Superintendent, State Reformatory, Rahway, N. J.; R. J. Potts, Professor of Highway Engineering, Agricultural and Mechanical College of Texas; Dr. E. Stagg Whitin, Secretary, National Committee on Prison Labor.

FOURTH SESSION.

WEDNESDAY, DECEMBER 10, 2 P. M.

Subject B.—Construction.

1. "Determination of the Amount of Realignment, Grading and Drainage to Be Done in Connection with Road Improvement."

   Paper: S. D. Foster, M. Am. Soc. C. E., Chief Engineer State Highway Department of Pennsylvania.

   Discussion: R. A. Meeker, State Highway Engineer, Department of Public Roads of New Jersey; J. H. MacDonald, ex-State Highway Commissioner of Connecticut; H. L. Bowlby, State Highway Engineer of Oregon; J. A. Johnston, Division Engineer, Massachusetts Highway Commission.

2. "Factors Governing a Proper Selection of Road or Street Pavement."

   Paper: L. R. Grabill, Superintendent of Suburban Roads, Washington, D. C.

   Discussion: Wm. D. Sohier, Chairman, Massachusetts Highway Commission; G. W. Tillson, M. Am. Soc. C. E., Consulting Engineer, Borough of Brooklyn, New York, N. Y.; W. A. McLean, M. Can. Soc. C. E., Chief Engineer of Highways and Commissioner of Ontario Public Roads and Highways Commission, Toronto, Ont., Canada; R. B. Gage, Chemist, Department of Public Roads, New Jersey; D. B. Goodsell, Assistant Engineer, Bureau of Highways, Borough of Manhattan, New York, N. Y.

FIFTH SESSION.

THURSDAY, DECEMBER 11, 10 A. M.

Subject B, Continued.

3. Short Papers on the Details of the Construction of Various Kings of Roads and Pavements.

"Bituminous Macadam and Bituminous Concrete."

Paper: Linn White, Chief Engineer, South Park Commissioners, Chicago, Ill.

Discussion: Arthur H. Blanchard, M. Am. Soc. C. E., Professor of Highway Engineering, Columbia University; F. C. Pillsbury, Division Engineer, Massachusetts Highway Commission.

"Earth Roads."

Paper: E. A. Kingsley, State Highway Engineer of Arkansas.

"Sand-Clay Roads."

Paper: E. J. Watson, Commissioner, Department of Agriculture, Commerce and Industries, South Carolina.

"Gravel Roads."

Paper: G. W. Cooley, State Engineer, Minnesota State Highway Commission.

"Concrete Roads."'

Paper: F. F. Rogers, C. E., State Highway Commissioner of Michigan.

"Brick Roads."

Paper: J. M. McCleary, Road Engineer, Cuyahoga County, Ohio.

"Wood and Asphalt Block."

Paper: H. H. Schmidt, Chief Engineer, Bureau of Highways, Borough of Brooklyn, New York, N. Y.

"Water Bound Macadam."

Paper: J. W. Hunter, Deputy State Highway Commissioner of Pennsylvania.

"Sheet Asphalt."

Paper: Geo. H. Norton, Deputy Engineer Commissioner, Buffalo, N. Y.

"Granite Block."

Paper: R. H. Gillespie, Engineer of Highways, Borough of The Bronx, New York, N. Y.

4. "Unit Price and Lump Sum Contracts and Percentage Work."

Paper: H. C. Hill, Engineer, Lane Construction Corporation, Meriden, Conn.

Discussion: J. J. Ryan, Secretary New York Road Builders' Association; C. A. Kenyon, President Indiana Good Roads Association; John W. Davitt, Contractor, Troy, N. Y.; J. T. Gephart, Jr., Assistant Engineer State Highway Department of Pennsylvania.

THURSDAY, DECEMBER 11, 2:30 P. M.

Automobile inspection trip covering recent road and pavement work in and around Philadelphia.

SIXTH SESSION.

THURSDAY, DECEMBER 11, 8 P. M.

Popular Program: Addresses by distinguished guests; illustrated talks on famous roads of the world. Program to be announced.

SEVENTH SESSION.

FRIDAY, DECEMBER 12, 10 A. M.

Subject B, Continued.

5. "The Testing of Materials for Road and Street Construction."

Paper: Prevost Hubbard, in charge Division of Roads and Pavements, The Institute of Industrial Research, Washington, D. C.

Discussion: F. P. Smith, Consulting Chemist and Paving Engineer, New York, N. Y.; J. E. Myers, Chief Chemist, New York State Commission of Highways; C. S. Reeve, Chemist, U. S. Office of Public Roads.

Subject C.—Maintenance.

1. "Sub-Organization for Securing Efficient Maintenance."

Paper: J. N. Carlisle, State Highway Commissioner of New York.

Discussion: A. B. Fletcher, Highway Engineer, California Highway Commission; J. S. Gillespie, Road Commissioner, Allegheny County, Pennsylvania; C. J. Bennett, State Highway Commissioner of Connecticut.

EIGHTH SESSION.

FRIDAY, DECEMBER 12, 2 P. M.

Subject C, Continued.

2. "General Methods of Repairs and Renewals."

Paper: A. W. Dean, M. Am. Soc. C. E., Chief Engineer, Massachusetts Highway Commission.

Discussion: Paul D. Sargent, M. Am. Soc. C. E., Chief Engineer, State Highway Commission of Maine; A. D. Williams, Chief Road Engineer of West Virginia; Robert C. Terrell, State Commissioner of Public Roads of Kentucky; H. G. Shirley, Chief Engineer, Maryland State Roads Commission; B. Michaud, Deputy Minister of Roads, Quebec, Canada.

3. "Bituminous Surface Treatment and Dust Prevention."

Paper: Wm. H. Connell, M. Am. Soc. C. E., Chief, Bureau of Highways and Street Cleaning, Philadelphia, Pa.

Discussion: C. W. Ross, Street Commissioner of Newton, Mass.; J. S. Sturdevant, Division Engineer, New York State Commission of Highways; W. L. Hempelmann, Engineer of Bituminous Roadways, Street Department, St. Louis, Mo.; C. F. Lawton, Superintendent, Street Department, New Bedford, Mass.

Reports of Committees; Meeting of the American Road Builders' Association; Selection of Nominal Committees; Adjournment.

FRIDAY EVENING, DECEMBER 12.

Association Banquet, Hotel Bellevue-Stratford.

A. R. B. A. Notes

William H. Connell, Chief of the Bureau of Highways and Street Cleaning of the Philadelphia Department of Public Works, has returned from the South, where he spent a vacation of a few weeks.

State Highway Commissioner W. J. Roberts of Washington, as noted in the issue of Nov. 22, has been appointed consulting engineer on the construction of the proposed system of county roads in King County, Washington. The cost of the work is expected to be approximately $3,000,000.

Considerable space is given in this issue of "Good Roads" to the report of the Board of Consulting Engineers of New York on highway work in that state. Two of the members of the board—Geo. C. Diehl, County Superintendent of Highways of Erie County, New York, and William DeH. Washington of Albany, N. Y.—are active members of the A. R. B. A., and the third member of the board—Harold Parker, Vice-President of the Hassam Paving Co., Worcester, Mass., is First Vice President of the Association.

The American Road Builders' Association

The American Road Builders' Association, formerly known as the American Road Makers' Association, was organized eleven years ago and held its first annual convention at Detroit, Mich., on February 13 and 14, 1903.

The success of this convention, at which the members met and exchanged experiences, led to the making of plans for annual conventions, with the result that a series of meetings has been held. Each year has marked increased success and the convention has come to be recognized as the principal event of its kind of the year. The second convention was held at Hartford, Conn., on Feb. 10 and 11, 1904, and was attended by over 1,100 delegates. The next convention was held at Port Huron, Mich., on Aug. 29, 30 and 31, 1905, an extra day having been added because of the interest manifested at the Hartford meeting. The fourth and fifth conventions were held, respectively, at Pittsburgh, Pa., March 12, 13 and 14, 1907, and at Buffalo, N. Y., July 7 and 8, 1908.

SAMUEL HILL,
President.

HAROLD PARKER,
First Vice President.

E. L. POWERS,
Secretary.

W. A. McLEAN,
Second Vice President.

GEO. W. TILLSON,
Third Vice President.

W. W. CROSBY,
Treasurer.

Executive Officers,
American Road Builders' Association

With the sixth annual convention at Columbus, Ohio, on Oct. 26 to 29, inclusive, 1909, the association began to broaden the scope of its meetings. The convention was lengthened to four days and an exhibition of road machinery and materials was held. The attendance was over a thousand; the four-day meeting proved successful, and the inclusion of the exhibition added greatly to its interests and value.

During the next year the name of the organization was changed to the American Road Builders' Association and it was chartered, without capital, under the New York law. These steps were taken because of the growth of the association's membership and its increasing importance as a factor in matters of road construction and maintenance, due, largely, to the great changes that had been brought about in conditions in the road building field. Since the organization of the association public interest had been greatly stimulated, a number of states had adopted the state aid principle and engineers had made marked advances in the science and art of road building.

The convention in 1910, the seventh meeting of the organization, was held at Indianapolis, Ind., on Dec. 6, 7, 8 and 9. In conjunction with the convention an exhibition of machinery and materials similar to that of the previous year was held. Over 1,400 delegates were registered at the meeting and so much interest and satisfaction in the exhibits were shown that it was decided to make the exhibition a permanent feature of the convention. In accordance with this decision, exhibitions were made in conjunction with both the eighth and ninth annual conventions, the former at Rochester, N. Y., on Nov. 14, 15, 16 and 17, 1911, and the latter at Cincinnati, Ohio, on Dec. 3, 4, 5 and 6, 1912.

Previous to the eighth annual convention at Rochester the meetings had been conducted in much the same manner as are the majority of road conventions at present—that is, the program comprised addresses and papers, each valuable in itself but having little relation to the other parts of the program. At the Rochester convention a change was made. Each session was devoted to the consideration of some particular topic which was introduced by a formal paper presented by an authority especially selected for his fitness to speak on that particular topic. The presentation of the paper was followed by two formal discussions by especially selected speakers, after which the question was thrown open for general discussion from the floor. By this method of conducting the proceedings the number of papers was very materially reduced and more time was given for discussion.

At the ninth annual convention in Cincinnati last year the method followed in conducting the technical sessions was very similar to that inaugurated at Rochester. After the

NELSON P. LEWIS.

C. A. KENYON.

T. C. DU PONT.

LOGAN WALLER PAGE.

A. W. DEAN.

S. D. FOSTER.

P. L. HARDISON.

FRANK D. LYON.

W. J. ROBERTS.

CLIFFORD RICHARDSON.

JAMES H. MACDONALD.

AUSTIN B. FLETCHER.

CHARLES HENRY DAVIS.

JOHN R. RABLIN.

CHARLES P. PRICE.

ARTHUR H. BLANCHARD.

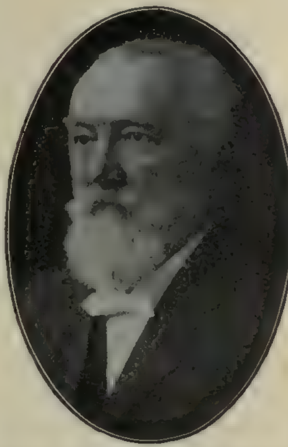
DIRECTORS OF THE AMERICAN ROAD BUILDERS' ASSOCIATION.

first session, which was devoted to the addresses of welcome and responses, a series of papers dealing with different phases of the general subject of highway work was presented. Each paper was followed by a discussion opened by some specially selected speaker and then by a general discussion from the floor. The last session was devoted to informal discussions of four topics, selected by the convention itself from a list of eight.

MORRIS L. COOKE,
Director of the Department of Public Works of Philadelphia.

WM. H. CONNELL,
Chief, Philadelphia Bureau of Highways, and Director, A. R. B. A.

The objects of the association are "to acquire and disseminate information concerning highway construction and maintenance in the states and cities of the Union and in the provinces and cities of Canada; to stimulate interest in the subject, and to promote educational, legislative and other measures tending to their accomplishment." Its membership is composed of five classes—active, associate, honorary, contributing and life members. Active members are those persons actively engaged in highway work or interested in highway development; associate members are societies or other organizations interested in the objects of the association; honorary members are persons who have performed distinguished service in the cause of highway extension and improvement; contributing members are commercial bodies contributing $100 per year, and life members are active or associate members making a payment of $500 on their election to membership.



RUDOLPH BLANKENBURG,
Mayor of Philadelphia.

The general management of the affairs of the association is vested in the board of directors, while the active work is delegated to the executive committee, consisting of the secretary, ex-officio, and two others. The annual meeting of the association for the election of officers and the transaction of business is held on the first Friday in February each year. Special meetings may be called by the board of directors or on the request of thirty active members.

The present officers of the association are as follows:

President, Samuel Hill, President of the Washington State Good Roads Association; First Vice President, Harold Parker, M. Am. Soc. C. E., Ex-Chairman, Massachusetts Highway Commission; Second Vice President, W. A. McLean, Chief Engineer of Highways and Commissioner of the Ontario Public Roads and Highways Commission; Third Vice President, George W. Tillson, Consulting Engineer to the President of the Borough of Brooklyn, New York, N. Y.; Secretary, E. L. Powers, Editor, "Good Roads"; Treasurer, W. W. Crosby, M. Am. Soc. C. E., Chief Engineer, Maryland Geological and Economic Survey, and Consulting Engineer.

R. A. MEEKER,
Director, A. R. B. A. and Member Convention Committee.

JOHN A. GAFFEY,
Member A. R. B. A. and of the Convention Committee.

Directors whose terms expire in 1916: William H. Connell, Assoc. M. Am. Soc. C. E., Chief, Bureau of Highways and Street Cleaning, Philadelphia, Pa.; T. Coleman du Pont, President, E. I. du Pont de Nemours Powder Co.; C. A. Kenyon, President, Indiana Good Roads Association; Nelson P. Lewis, M. Am. Soc. C. E., Chief Engineer, Board of Estimate and Apportionment, New York, N. Y.; R. A. Meeker, State Highway Engineer of New Jersey; Logan Waller Page, M. Am. Soc. C. E., Director, United States Office of Public Roads.

Directors whose terms expire in 1915: A. W. Dean, M. Am. Soc. C. E., Chief Engineer, Massachusetts Highway Commission; S. D. Foster, Assoc. M. Am. Soc. C. E., Chief Engineer, Pennsylvania State Highway Department; P. L. Hardison, Assistant Engineer, Maine State Highway Commission; Frank D. Lyon, Ex-Deputy Commissioner of Highways of New York; W. J. Roberts, M. Am. Soc. C. E., State Highway Commissioner of Washington; Clifford Richardson, M. Am. Soc. C. E., Consulting Engineer, New York, N. Y.

Directors whose terms expire in 1914: James H. MacDonald, Ex-State Highway Commissioner of Connecticut; Austin B. Fletcher, M. Am. Soc. C. E., State Highway Engineer of California; Charles Henry Davis, M. Am. Soc. C. E., President, National Highways Association; John R. Rablin, Chief Engineer, Metropolitan Park Commission, Boston, Mass.; Charles P. Price, Assoc. Am. Soc. C. E., Manager, American Tar Co.; Arthur H. Blanchard, M. Am. Soc. C. E., Professor of Highway Engineering, Columbia University, New York, N. Y.

The executive committee consists of George W. Tillson, E. L. Powers and R. A. Meeker.

The American Road Builders, Association was the first road organization of national importance in the United States, and though it has been extensively imitated it still remains the foremost body of road builders in this country, if not in the world. It is the only organization which holds conventions devoted exclusively to the consideration of the practical questions of organization, construction and maintenance which the actual road builder has to meet. Its membership is composed principally of those whose daily work is the building or maintaining of roads or streets and includes practically all of the state highway commissioners and engineers and the best known men engaged in highway work, either in connection with city streets or country roads. Its membership is constantly growing and during the past year has very greatly increased.

LETTERS TO THE EDITOR

Concrete Roads of Wayne County, Michigan

Editor "Good Roads:"

All persons interested in the selection of suitable surfaces for our public highways are indebted to Frank F. Rogers, the Michigan Highway Commissioner, for the data given in his paper on concrete roads read recently at the American Road Congress, Detroit. The following table from Mr. Rogers' paper shows the condition of the various sections of cement concrete roads in Wayne County, Mich., concerning which he states:

> The first (traffic) records were taken for one continuous week beginning August 21 1913. For the purpose of this record the defects in slabs or sections (25 ft. in length of road between expansion joints) have been classified as longitudinal, transverse and diagonal cracks, and holes.

Many valuable conclusions can be deduced from a careful analysis of this table. In table II the writer has rearranged the data of table I by grouping the roads in the years constructed, and eliminating data regarding width and depth of concrete, kind of mixture employed, subsoil and traffic conditions. The total number and percentage of the different kinds of defective 25-ft. sections in each year's work are shown.

In considering this data it should be constantly borne in mind:

First: That only such defects are reported as were visible at the time the examination was made.

Second: That a patrol system for a long time has repaired defects which demanded attention. It is understood that one crew, of a team and six men, is constantly employed for maintenance, and a like crew much of the time.

Third: That considerable portions of the roads have had the entire surface covered with a tar paint coat and sand; some portions having had two surface applications of this material; so that some defects were covered up and invisible.

Total Defects.—Table II gives data for the following conclusions regarding the total defective 25-ft. sections in these roads:

At end of first year (laid 1912)	10.0%
At end of second year (laid 1911)	22.1%
At end of third year (laid 1910)	50.0%
At end of fourth year (laid 1909)	65.5%

At this rate of increase in percentage of defective sections from year to year, practically all the sections will be defective not long after the fourth year.

Holes.—Holes are the most serious of the defects classified. When holes are repaired, the sections must be barricaded against traffic for at least ten days to permit new concrete to set hard enough to bear traffic.

Holes at end of first year (laid 1912)	0.3%
Holes at end of second year (laid 1911)	0.9%
Holes at end of third year (laid 1910)	6.7%
Holes at end of fourth year (laid 1909)	18.2%

These figures indicate that the holes (visible in 1913) had increased in percentage from year to year in a ratio more alarming than the total defects above given. From the third to the fourth year the visible holes increased from 6.7 per cent. to 18.2 per cent. of the total number of 25-ft. sections. Data have not been supplied as to how many holes had been repaired and therefore were invisible at the time of the examination; but it is safe to assume that holes would not be allowed to remain long in thoroughfares leading out of

NAME OF ROAD	NUMBER OF 25 FT SECTIONS	WIDTH	DEPTH	AGGREGATE	MIX	YEAR BUILT	SOIL BUILT ON	TRAFFIC COUNT 24 HRS AVERAGE 1 WEEK	% MOTOR DRIVEN	% HORSE VEHICLES	DEFECTIVE SECTIONS					
											LONGITUDINAL CRACKS	TRANSVERSE CRACKS	DIAGONAL CRACKS	HOLES	TOTAL NUMBER	TOTAL %
WOODWARD AVE	209	18'	6½"	CRUSHED COBBLES SAND	1-2½-5 1-2-3	1909	CLAY LOAM	2160	88.1-	11.9+	80	32	2	46	160	76.5+
WOODWARD AVE.	252	18	6½"	CRUSHED COBBLES SAND	1-2½-5 1-2-3	1910	SAND LOAM				29	22	6	11	68	27.0-
GRATIOT AVE	326	16'	7"	WASHED PEBBLES SAND	1-1½-3	1911	CLAY LOAM	507	65.8+	34.2-	11	10	3	6	30	9.2+
GRAND RIVER AVE	61	18'	6½"	CRUSHED COBBLES SAND	1-2½-5 1-2-3	1909	CLAY LOAM	1064	56.5+	43.5-	11	2	1	3	17	27.9
GRAND RIVER AVE	308	16'	6½"	CRUSHED COBBLES SAND	1-2½-5 1-2-3	1910	CLAY LOAM				59	20	29	46	154	50.0-
GRAND RIVER AVE	515	16'	7"	WASHED PEBBLES SAND	1-1½-3	1911	SAND LOAM				13	26	3	6	48	9.3
GRAND RIVER AVE	1208	16'	7"	WASHED PEBBLES SAND	1-1½-3	1912	SAND LOAM	352	66.5-	33.5+	70	44	13	5	132	10.9
MICHIGAN AVE	481	17'-8"	6½	WASHED PEBBLES SAND	1-2-4	1910	CLAY LOAM	1009	67.5+	32.5-	219	48	23	21	311	64.6+
MICHIGAN AVE	1570	18 16	7"	WASHED PEBBLES SAND	1-1½-3	1911	SAND LOAM				219	80	42	14	355	22.6+
RIVER ROAD	149	15	6½	WASHED PEBBLES SAND	1-2-4	1910	CLAY	538	78.9+	21.1-	49	5	6	2	62	41.6+
RIVER ROAD	434	15'	7"	WASHED PEBBLES SAND	1-1½-3	1911	CLAY				165	17	13	0	195	44.9+
RIVER ROAD	213	15	7	WASHED PEBBLES SAND	1-1½-3	1912	CLAY				14	8	4	0	26	12.2+
RIVER ROAD	208	15	7"	WASHED PEBBLES SAND	1-1½-3	1912	CLAY				17	9	0	0	21	10.0+
FORT ST ROAD	450	12'	7"	WASHED PEBBLES SAND	1-1½-3	1912	CLAY				0	19	9	1	29	6.5-

TABLE I. DEFECTIVE SECTIONS ON WAYNE COUNTY ROADS—FROM F. F. ROGER'S PAPER.

NAME OF ROAD.	YEAR BUILT.	NUMBER OF 25 FOOT SECTIONS.	DEFECTIVE SECTIONS.									
			Longitudinal Cracks.		Transverse Cracks.		Diagonal Cracks.		Holes.		Total Number.	
			Number.	%	Number.	%	Number.	%	Number.	%	Number.	%
Woodward Ave.	1909.	209	80.		32.		2.		46.		160.	76.5
Grand River Ave.	1909.	61	11.		2.		1.		3.		17.	27.9
TOTALS.		270	91.	33.7	34.	12.6	3.	1.1	49.	18.2	177.	65.5
Woodward Ave.	1910.	252	29.		22.		6.		11.		68	27.0
Grand River Ave.	1910.	308	59.		20.		29.		46		154.	50.0
Michigan Ave.	1910.	481	219.		48.		23.		21.		311.	64.6
River Road Ave.	1910.	149	49.		5		6.		2.		62.	41.6
TOTALS.		1190	356.	30.0	95.	8.0	64.	5.4	80.	6.7	595.	50.0
Gratiot Ave.	1911.	326	11.		10.		3.		6.		30.	9.2
Grand River Ave.	1911.	515	13.		26.		3.		6.		48	9.3
Michigan Ave.	1911.	1570	219.		80.		42.		14.		355.	22.6
River Road.	1911.	434	165.		17		13.		0.		195.	44.9
TOTALS.		2845	408	14.3	133.	4.7	61.	2.2	26.	0.9	628.	22.1
Grand River Ave.	1912.	1208	70.		44.		13.		5.		132.	10.9
River Road.	1912.	213	14.		8.		4.		0.		26.	12.2
River Road.	1912.	208	17.		9.		0.		0.		21.	10.0
Fort St. Road.	1912.	450	0		19.		9.		1.		29.	6.5
TOTALS.		2179	101	4.8	80.	3.8	26.	1.3	6.	.3	208	10.0

TABLE II.—DEFECTIVE SECTIONS ON WAYNE COUNTY CONCRETE ROADS, ARRANGED ACCORDING TO YEAR BUILT—REARRANGEMENT OF DATA IN TABLE I.

Detroit and that many such must have been repaired. For instance, P. E. Green, C. E., of Chicago, who examined that part of Grand River Ave. laid in 1909 on June 18, 19 and 20, 1913, says: ("Engineering and Contracting," Oct. 1, 1913.) "Many holes have developed and have been filled with tar, practically every slab having one, two or more." Because there are 61 slabs or sections in this piece of road, this means that at least 61 holes were present on June 18, 1913. The data given in the foregoing tables report the 1909 portion of this avenue as having only three sections containing holes. Furthermore if several holes existed in one section at the time of the examination on Sept. 2 to 4, 1913, they were reported only as one defective section. Eighteen per cent. of defective sections containing only one hole each means at least one hole in every 137 lin. ft. of road and probably many more. A roadway of any of the standard forms of pavement construction containing a hole every 137 ft. would generally be admitted to be in bad condition.

Cracks.—Diagonal cracking is shown to be quite infrequent. Transverse and longitudinal cracks are recorded as follows:

Cracks	Road Laid	Longitudinal	Transverse
At end of first year	1912	4.8%	3.8%
At end of second year	1911	14.3%	4.7%
At end of third year	1910	30.0%	8.0%
At end of fourth year	1909	33.7%	12.6%

No data of the size and condition of the cracks are given. Several cracks may exist in the same section reported as one defective section. Cracks are objectionable from a traffic standpoint only when they are wide; but they are unsightly and present a weakness in structure which will result in rapid abrasion and admit water which injures by freezing and otherwise. Cracking, especially transverse cracking, evidently rapidly increases with the age of these roads.

Traffic.—Unfortunately data is not furnished showing the tonnage per foot or yard of width of roadway necessary for reliable data for comparisons with standardized records of traffic in many places. The traffic record in the form reported does not warrant any definite conclusions. Some of these roads shown to have light traffic have more defects than others of heavier traffic. It is clear that cracking, which is an inherent defect of exposed concrete road surfaces, occurs with little reference to the traffic, heavy or light. The holes, while undoubtedly aggravated by traffic, are rather due to the irregularities and defects of concrete, supplemented by its inability to withstand much traffic without abrasion and raveling.

Cost of Repairs.—The Wayne County concrete roads have been mentioned in many articles in the United States and Canada, coupled with statements of alleged low cost of maintenance. The maintenance—or repair—done on these and other such roads has been greater than some suppose. Wayne County will do a great service if it will record all expenses connected with past and future repairs to the concrete and to tar painting. Economic, continual maintenance and not cheap first cost constitutes true economy for roads and pavements. If roads are paid for by long-time bond issues, it is a financial imposition on the present and next generations, to forget or ignore this fact and risk having bonds run longer than, with a little maintenance from current taxes, roads will endure.

J. W. HOWARD, C. E., E. M.,
Consulting Engineer.
1 Broadway, New York, N. Y.

MEETINGS

Previously Reported

(Issues of November 8, 15, 22 and 29)

ARIZONA GOOD ROADS ASSOCIATION.—Third annual meeting, Phoenix, Ariz. Nov. 6. Page 248, Nov. 22.

BAKERSFIELD, CAL.—Good roads banquet. Page 247, Nov. 22.

BIRMINGHAM-MONTGOMERY HIGHWAY ASSOCIATION.—Organization meeting, Clanton, Ala., Oct. 22. Page 247, Nov. 22.

BLAINE COUNTY GOOD ROADS ASSOCIATION.—Hailey, Idaho, Oct. 17. Page 247, Nov. 22.

BORDERLAND ROUTE ASSOCIATION.—Organization meeting, Phoenix, Ariz. Page 248, Nov. 22.

CENTRAL AVENUE IMPROVEMENT ASSOCIATION.—Organization meeting, Los Angeles, Cal., Oct. 28. Page 248, Nov. 22.

COLUMBUS, GA.—Mass meeting, Oct. 30. Page 244, Nov. 15.

GEORGIA-CAROLINA GOOD ROADS CONGRESS.—Augusta, Ga., Nov. 6. Page 247, Nov. 22.

GUTHRIE CENTER, IA.—Mass Meeting, Oct. 23. Page 240, Nov. 8.

LINCOLN HIGHWAY ASSOCIATION OF ALLIANCE.—Organization meeting, Alliance, Ohio, Nov. 14. Page 252, Nov. 29.

LION COUNTY GOOD ROADS CLUB.—Organization meeting, Tallahassee, Fla., Nov. 14. Page 252, Nov. 29.

MANITOBA GOOD ROADS ASSOCIATION.—First banquet, Winnipeg, Man., Oct. 29. Page 248, Nov. 22.

MIDLAND AUTOMOBILE ASSOCIATION.—Organization meeting, Midland, Tex. Page 240, Nov. 8.

MONTGOMERY COUNTY AUTOMOBILE AND GOOD ROADS ASSOCIATION.—Organization meeting, Conroe, Tex., Oct. 4. Page 244, Nov. 15.

NORTH CAROLINA DIVISION OF SOUTHERN NATIONAL HIGHWAY ASSOCIATION.—Asheville, N. C., Nov. 7. Page 248, Nov. 22.

OCEAN TO OCEAN HIGHWAY ASSOCIATION.—Third annual meeting, Los Angeles, Cal., Oct. 24-25. Page 244, Nov. 22.

OKLAHOMA, TEXAS AND GULF HIGHWAY ASSOCIATION.—Organization meeting, Nov. 18. Page 252, Nov. 29.

ROCK FALLS, ILL.—Mass meeting, Nov. 19. Page 252, Nov. 29

SELMER BUSINESS MEN'S CLUB.—Good roads meeting, Selmer, Tenn., Oct. 24. Page 248, Nov. 22.

SOUTHERN APPALACHIAN GOOD ROADS ASSOCIATION.—Fifth annual convention, Asheville, N. C., Oct. 22-23. Page 244, Nov. 15.

SPARTANBURG COUNTY GOOD ROADS ASSOCIATION.—Spartanburg, S. C., Oct. 31. Page 244, Nov. 15.

STERLING, ILL.—Mass meeting, Nov. 19. Page 252, Nov. 29.

SUPERINTENDENTS OF STATE HIGHWAYS OF PENNSYLVANIA.—First annual conference, Harrisburg, Pa., Oct. 22. Page 247, Nov. 22.

TEMPLE, TEX.—Mass meeting, Oct. 25. Page 247, Nov. 22.

TEXAS CONVICT-BUILT ROAD ASSOCIATION.—Organization meeting, Dallas, Tex., Oct. 29. Page 244, Nov. 15.

TEXAS GOOD ROADS ASSOCIATION.—Dallas, Tex. Page 252, Nov. 29.

TUPELO, MISS.—Oct. 21. Page 240, Nov. 8.

At a meeting held recently in Pinson, Tenn., the organization of the Madison County executive committee of the Jackson-to-Corinth Highway was effected. Advocates of good roads from the neighboring towns along the route of the highway were present, including Clapton Thomas, general chairman of all the highway executive committees, and W. E. McClannock, chairman of the committee for Madison County.

The Washington State Good Roads Association held its fourteenth annual session at North Yakima, Wash., beginning Nov. 20, with a large attendance of delegates from various parts of the state. The program included addresses by road builders of the state. The delegates were entertained by the Yakima Commercial Club, the members of which took them on an automobile inspection tour, and, on the last evening of the convention, held a smoker in their honor. According to Secretary John P. Hartman, the convention was one of the most successful ever held under the auspices of the association.

COMING MEETINGS

December 9-12.—American Road Builders' Association.—10th Annual Convention, 4th American Good Roads Congress and 5th Annual Exhibition of Machinery and Materials, First Regiment Armory Bldg., Philadelphia, Pa. Secretary, E. L. Powers, 150 Nassau St., New York, N. Y.

January 26-27.—Texas Good Roads Association.—Annual meeting, Fort Worth. Secretary, Homer D. Wade, Stamford, Tex.

February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

REPORTS

BOARD OF COUNTY ROAD COMMISSIONERS OF WAYNE COUNTY, MICHIGAN; Seventh Annual Report to the Board of Supervisors of Wayne County; from October 1, 1912, to September 30, 1913, inclusive.—Paper; 6x9 ins., 96 pp.; illustrated.

Included in this report are detailed descriptions of the administration of road affairs in Wayne County and the construction of the concrete roads built there; traffic records, and cost data. The subject-matter of the report includes several special features, among them being a discussion of the cracking of concrete, together with records of the cracks found on various roads built by the commission; accounts of tests to determine the effect of variation in the amount of mixing on the compressive strength of concrete; a detailed description of the method of construction, and records of traffic on various roads. There are also included a chapter on the changes in the road laws in Michigan and the specifications of the Wayne County Commission. The report is profusely illustrated with halftones showing roads before, during and after improvement; bridges, both old and new, and other views incident to road work in the county.

STATE OF NEW YORK, COMMISSION OF HIGHWAYS, REPORT OF THE BOARD OF CONSULTING ENGINEERS. Submitted to John N. Carlisle, Commissioner of Highways, by George C. Diehl, Harold Parker and Wm. DeH. Washington, Board of Consulting Engineers. Paper; 6x9 ins., 37 pp.; 2 inset charts.

The Board of Consulting Engineers making this report was appointed by State Highway Commissioner Carlisle, soon after he assumed office, for the purpose of making an investigation of the conditions existing in the department and suggesting such changes as seemed advisable. The report first takes up the development of the department, outlining the original state aid laws passed in 1898 and those enacted since that time. It then outlines briefly a suggested plan of reorganization, after which it discusses the subjects of traffic census, specifications and the determination of types of pavements. Following this the subjects of state and county highways, town highways, bridges and road signs are discussed briefly. Several pages are then devoted to a detailed description of the proposed organization and the duties of the various officers and employees provided for by it. This is followed by an outline of the order of procedure to be followed in the construction of a county highway; a chapter upon the geological distribution of road material throughout the state and a conclusion in which various recommendations are made. Included in the report are two inset charts, one showing the proposed organization of the department and the other showing graphically the procedure followed in the construction of a county highway. The report is accompanied by an appendix comprising a set of general specifications.

PERSONAL NOTES

Morrel Vrooman, Assoc. M. Am. Soc. C. E., has resigned as City Engineer of Gloversville, N. Y., and will hereafter devote his entire time to the firm of Vrooman & Perry, consulting engineers and sanitary experts.

Russell D. Wilson, Assistant City Engineer of Winnipeg, Man., was killed on Nov. 17. Death was caused by Mr. Wilson's hand coming in contact with a live wire, carrying 13,000 volts, when he was making an inspection tour over the city line, six miles north of Winnipeg.

Walter E. Emery, of Peoria, Ill., has been appointed by the Illinois State Highway Commission as County Superintendent of Highways of Peoria County. The appointment was made in accordance with the recently enacted Tice good roads law, and Mr. Emery will be the first superintendent in Peoria County. For the past five years he has been Chief Engineer of the Peoria & Pekin Union Railway, and was the only one of four candidates taking the civil service examination for the office who passed.

NEW PUBLICATIONS

ROAD LAWS OF WEST VIRGINIA, 1913; Compiled by the State Road Bureau, A. Dennis Williams, Chief Road Engineer; Issued by the Department of Agriculture, Howard E. Williams, Commissioner.—Paper; 6x9 ins.; 122 pp.

The contents of this publication include Chapter 52 of the Acts of 1909 as amended by the Acts of 1911; Chapter 41 of the Acts of 1913, the law establishing the Road Bureau of the state; motor vehicle laws, and various enactments of the Legislature bearing upon road work. Among the laws are those relating to prison labor, toll roads, toll bridges and the taking of private property for public use. The book is well printed and bound in paper covers and is thoroughly indexed.

THE ENGINEERING CONTRACTOR.—Journal of the American Society of Engineering Contractors. Published monthly at the rooms of the American Society of Engineering Contractors, 11 Broadway, New York, N. Y., R. M. Hooker, Business Manager, "The Engineering Contractor," 168 Duane St., New York, N. Y. 9x12 ins.

Volume 1, No. 1, "The Engineering Contractor," dated October, 1913, consists of 16 pages of text and 8 pages of advertising, exclusive of the covers. The publication takes the place of the former journal of the American Society of Engineering Contractors and, according to an announcement on the first page, is designed to enable the setting forth in greater detail of the activities of the society. It will contain, it is stated, as little as possible of the matter that may be found in other technical papers, and no scientific or theoretical technical articles and no historical or general engineering essays will be printed in it, its object being to give prominence to articles, discussions and news relating to specifications, cost, methods, management and the legal and business phases of contract work. The paper is edited by the secretary, acting for the committee on publications. The October issue, in which is included the September number, contains the announcement referred to; an editorial, "Is Scientific Management a Failure?" an article on "Human Nature on Construction Work" by C. H. Hollingsworth, General Superintendent of the Buffalo Dredging Co., Buffalo, N. Y., and a member of the American Society of Engineering Contractors, and a short poem, "The Hobo's Lament." There is also a frontispiece consisting of a cartoon entitled "History As It Might Have Been—The Confusion of Tongues."

NEWS OF THE TRADE

Thomas M. Roche, who, as noted in a recent number of "Good Roads," resigned as manager of the Road Department of the American Asphaltum & Rubber Co. of Chicago, to engage in the selling of road material and machinery, has been appointed Western Sales Agent of the United States Asphalt Refining Co., 90 West St., New York, N. Y. Mr. Roche's headquarters are in the Monadnock Block, Chicago, Ill.

Walter H. Flood, formerly Chief Chemist of the municipal asphalt plant, and the Engineering Chemist of the Bureau of Engineering of Chicago, announces the opening of his consulting laboratory at 613 Bonheur Building, 326 River St., Chicago, where he will engage in a general chemical engineering practice. He will give especial attention to the testing and inspection of road materials, paving specifications, and industrial problems.

The Good Roads Construction Co., 518 Monadnock Block, Chicago, Ill., of which Arthur S. Lewis, formerly Superintendent of Lincoln Park, Chicago, is the General Manager, has recently been awarded contracts for two asphaltic concrete paving jobs. One is at Pontiac, Mich, and involves the construction of 20,000 sq. yds. of asphaltic concrete on a concrete base. The other is at the Municipal Tuberculosis Hospital of Chicago, Ill., where the work comprises the building of 23,000 sq. yds. of asphaltic concrete on macadam base.

The Wemlinger Co., Incorporated, 11 Broadway, New York, N. Y., which is associated with the Wemlinger Steel Piling Co., has been appointed New York and New Jersey sales agent for the Waterloo Cement Machinery Corporation of Waterloo, Ia., which manufactures the "Polygon" and "Little Wonder" concrete mixers. The Wemlinger Co. announces that it will carry a full stock of various sizes of these machines as well as a complete line of repair parts. The company will also handle the accounts of the Glide Road Machine Co., Minneapolis, Minn., manufacturer of the Glide road graders; the Lourie Mfg. Co., Springfield, Ill., manufacturer of the Staley power tamping machine, and the Archer Iron Works, manufacturers of concrete towers and hoists. Parker U. Cole, formerly the New York Sales Manager of the Waterloo Cement Machinery Corporation, will act in a similar capacity for the Wemlinger Co.

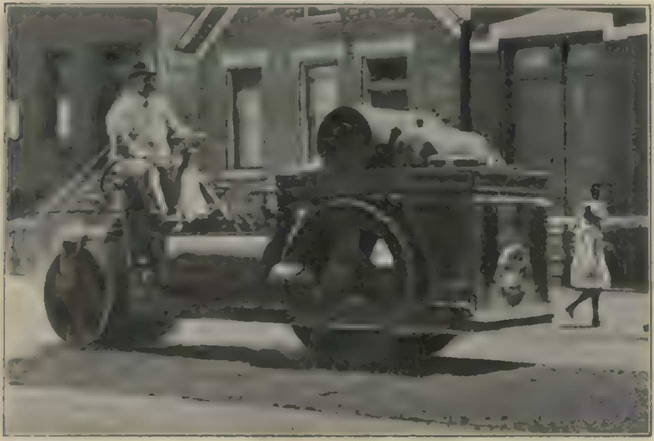
The Link-Belt Co., of Chicago, Ill., has recently issued a 32-page booklet, entitled "Link-Belt Conveyors for Sand, Stone, Gravel, Etc." The company has also issued Bulletin No. 194, in which attention is drawn to a new car unloader, which consists of a heavy bucket elevator, hung on the end of a boom which may be lowered and raised in and out of the car by means of a wire rope and winch. The material is fed into the buckets, which are fitted with steel edges, by shovelers in the car, and is then conveyed by means of a steel spout to a second fixed elevator which fills the bin. The manufacturers claim that the advantages of using two elevators are, first, that it decreases the weight on the hinged part, and, second, that the material may be spread upon the ground at each side of the pocket as a reserve storage if desirable. With this outfit, according to its manufacturers, two or three men can unload a car of material at the rate of 50 tons an hour. The unloader is built to be set up as either a portable or stationary machine. The booklet contains many photographs of the Link-Belt conveyors, the "20th Century" portable asphalt paving machines, and other machinery in actual work. The booklet is 6 by 9 ins. in size and is printed on paper of good quality.

The extent to which bituminous broken stone roads built by the mixing method are being used is shown very strikingly by the amount of Warrenite which has been put down in various parts of Pennsylvania. Warrenite is laid under the patents of Warren Brothers Co. of Boston, Mass., and, according to information supplied by that comany, has been laid on concrete foundations on the following state roads: Sewickley Heights and the Butler Plank, Allegheny Co.; Harrisburg, Dauphin Co.; Siegersville, Lehigh Co.; Vicksburg, Union Co., and Dallastown, York Co. As a resurfacing over old macadam it has been used on the Three Degree, the Miller's Run, the Library, the Campmeeting, the Portview, the Lock No. 3 and the Panghorn Hollow Roads, and for resurfacing over telford it has been used on the Monongahela City and Finleyville Road and on the National Pike in Washington Co. and on the West Run Road in Allegheny Co.

NEW MACHINERY AND APPLIANCES

Tandem Motor Roller

After a series of experiments, a tandem motor roller embodying a number of new features has been placed on the market. The machine was first exhibited at the Detroit road convention, the one now on the market being the 5-ton machine. The 6-ton machine is ready for the market, and the 7-ton and the 8-ton rollers are expected to be ready soon after the first of the year.


NEW AUSTIN TANDEM ROLLER.

The 5-ton machine, which is shown in the accompanying illustration, has a length, over all, of 170 ins., a width, over all, of 54½ ins., and a height, over all, of 69 ins. The roller is driven by a two-cylinder gasoline motor equipped with two forward and two reverse speeds. The diameter of the rear roll is 46 ins. and of the front roll 33 ins., the width of rolls being 42 ins. The clearance under the frame is 11 ins. The motor and all gears are enclosed and the machine is equipped with both power and hand steering gears. The speeds on low and high gear are 2¼ and 3½ miles per hour, respectively. The gasoline tank has a capacity of 25 gals., the sprinkling tank of 60 gals., and the cooling tank of 100 gals. Besides the operating and steering levers, which are within easy reach of the operator's hands, there is a foot brake.

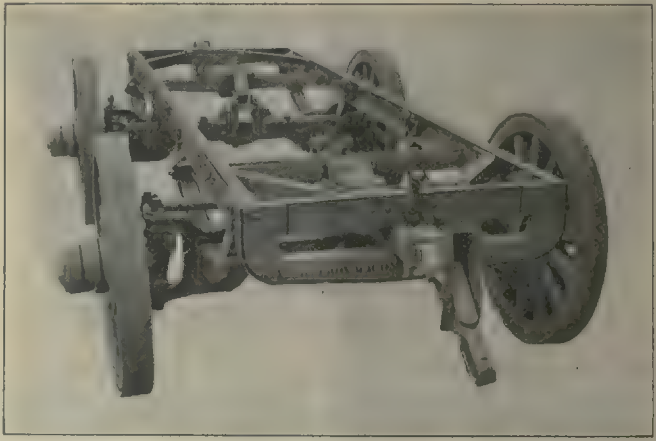
Among the advantages claimed for the machine are steadiness because of its low center of gravity, the ease and quickness with which the engine may be stopped and started and the freedom from vibration secured by the double-cylinder, horizontal opposed motor. It is also claimed that the operator can obtain a good view of the pavement even when sitting.

The machine is known as the Austin Tandem Motor Roller and is made by the Austin Mfg. Co., of Chicago, Ill.

Trailer for Motor Trucks

In the accompanying illustration is shown the chassis of a motor truck trailer which has recently been brought out.

The length, over all, is 14 ft. 5 ins., and the width, over all, 7 ft. ½ in. The frame is 3 ft. 5½-ins. wide and 11 ft. 10 ins. long and the height from the ground to the top of the frame (with no load) is 2 ft. 10½ ins. The wheel base is 6 ft. 9 ins., the height of the wheels 3 ft. and the width of track from center to center of tires 5 ft. 4½ ins. The tires are 4 ins. by ¾ in. The road clearance under the axles is 17 ins., and the clear space between steering bars is 4 ft. 8 ins. The chassis weighs 3,330 lbs. and has a capacity of from 2 to 5 tons.


TROY TRAILER FOR MOTOR TRUCKS.

The frame is of channel steel and the wheels are of heavy artillery type, each fitted with 14 hickory spokes. The draw bars are connected to the main frame of the trailer and not to the axles, the connection being made by king bolts through draft beams directly over the axles. The draw bar is telescopic in form containing a coil spring which starts in compression at 200 lbs. pressure and is completely compressed at 2,000 lbs. pressure, and is so arranged that it is in compression whether the trailer is pulled or pushed. The load is supported on four 3½-in. by 48-in. springs, each of which is connected with the frame by flexible shackles at its two ends. It is claimed that the draw bar arrangement and the method of attaching the wheels and axles to the frame provide complete resiliency throughout the trailer under all road conditions and prevent shock to the motor.

It is said that the trailer is the outcome of two years of experiment in adapting trailers to use behind the modern motor truck. It is manufactured by the Troy Wagon Works Co. of Troy, Ohio.

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Copy for advertisements of which proofs are to be submitted to advertisers should reach the New York office as follows: For insertion in the first issue of the month, by the fifteenth of the preceding month; for other issues, by noon on Thursday of the week before date of issue.

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Tenth Annual Convention of the American Road Builders' Association

The tenth annual convention of the American Road Builders' Association and the fifth annual exhibition of road machinery and materials, comprising the Fourth American Good Roads Congress, were held at Philadelphia, Pa., on Tuesday, Wednesday, Thursday and Friday of this week. The congress was held in the First Regiment Armory, Broad and Callowhill Sts., and was attended by over three thousand delegates and guests.

The congress included an opening session on Tuesday forenoon, six technical sessions on the four days of the meeting and a public meeting on Thursday evening, besides an automobile inspection trip on Thursday afternoon, an association banquet on Friday evening, and the exhibits. All of the technical sessions were held in the armory and all of the exhibits were displayed there except a few consisting of the larger and heavier machines, which were placed in a large tent or were shown in the open. The public meeting was held in the ball room of the Bellevue-Stratford Hotel and the banquet in the "Red Room" of the same hotel.

In the following paragraphs there is given a brief account of the proceedings and of the principal events of the congress, chronologically arranged, together with a list of the exhibitors. The issue of "Good Roads" for January 3 will contain the stenographic report of the congress, and the majority of the papers and discussions. The papers and discussions not printed at that time will appear in the issue of February 7.

Tuesday, December 9.

The first session of the convention was called to order by President Samuel Hill of the American Road Builders' Association at 1:00 p. m. The lateness of the hour was due to the fact that Governor Tener, who had been expected to welcome the delegates on behalf of the state of Pennsylvania, had been detained, and it had been hoped that he would arrive in time to speak at the first session. After announcing that the Governor's train would not arrive until about two o'clock in the afternoon and that the Governor would then address the delegates, President Hill introduced Director of Public Safety George D. Porter, of Philadelphia, who, as Acting Mayor, spoke in the place of Mayor Blankenburg, who was out of town. Director Porter spoke briefly on road and street work, welcomed the delegates on behalf of the city and expressed the hope that the convention would be of great benefit, not only to them but to the city of Philadelphia.

After announcing that Governor Tener would speak at the afternoon session, which would commence at 2:30, President Hill said that at that time he would respond on behalf of the American Road Builders' Association. The last business of the session was the appointment of the committees on credentials and resolutions, after which the convention adjourned until 2:30 p. m.

The committees appointed by President Hill were as follows:

Credentials: H. G. Shirley, Maryland, Chairman; E. E. Coovert, Oregon; A. T. Laing, Toronto, Ontario, Canada; R. A. Meeker, New Jersey; G. A. Nelson, Alabama; Harold Parker, Massachusetts; F. C. Pillsbury, Massachusetts; E. L. Powers, New York.

Resolutions: F. F. Rogers, Michigan, Chairman; C. J. Bennett, Connecticut; F. W. Buffum, Missouri; J. N. Carlisle, New York; G. W. Cooley, Minnesota; John Craft, Alabama; T. J. Ehrhart, Colorado; N. Vermilyea, Ontario, Canada; W. O. Hotchkiss, Wisconsin; S. P. Hooker, New Hampshire; E. A. James, Ontario, Canada; A. N. Johnson, Illinois; C. M. Kerr, Louisiana; E. A. Kingsley, Arkansas; James R. Marker, Ohio; T. H. MacDonald, Iowa; J. Hyde Pratt, North Carolina; R. J. Potts, Texas; Wm. D. Sohier, Massachusetts; E. A. Stevens, New Jersey; Paul D. Sargent, Maine; Sidney Suggs, Oklahoma; R. C. Terrell, Kentucky; James Wilson, Delaware; A. D. Williams, West Virginia; E. J. Watson, South Carolina.

The second session of the convention was called to order by President Samuel Hill at 2:30 p. m. The first speaker of the afternoon was Governor Tener, who was introduced by the chairman immediately after the meeting had come to order.

In opening his address Governor Tener referred to the question of good roads as one of the greatest material interest to the whole country, and expressed the hope that its consideration at the congress would be along practical lines. He spoke at some length on road work in Pennsylvania, with special reference to the State Highway Department, and, in closing, extended the welcome of the state and expressed the hope that the meeting would be one of the greatest profit.

At the conclusion of Governor Tener's address President Hill spoke briefly in response to the welcome extended on behalf of the state and on behalf of the city. During his address he referred to the American Road Builders' Association, its personnel and its work; to the problems confronting American road builders and to the providing of ways and means for road betterment. In closing he spoke of the

Pacific Highway Association and its work, and of the proposition to celebrate the signing of the Treaty of Ghent by the erection of tablets, monuments and arches at the points where highways cross the boundary between the United States and Canada.

At the close of his address President Hill introduced State Highway Commissioner E. A. Stevens, of New Jersey, who presented the first technical paper of the convention—"Highway Officials, Their Duties and Powers." Commissioner Stevens' paper was discussed by A. N. Johnson, State Highway Engineer of Illinois, and by State Highway Engineer Hirst, of Wisconsin.

The next speaker was State Superintendent of Highways S. Percy Hooker, of New Hampshire, who presented the second paper on organization—"Division of Expense, Responsibility and Authority Between Nation, State, County and Town." The first speaker to discuss Mr. Hooker's paper was Chief Engineer Nelson P. Lewis, of the Board of Estimate and Apportionment of New York City. Mr. Lewis was followed by Harold Parker, former Chairman of the Massachusetts Highway Commission, and Jean de Pulligny, Director of the French Mission of Engineers to the United States.

The last speaker of the afternoon was Commissioner W. A. McLean, of the Ontario Public Roads and Highways Commission. Mr. McLean said that the French highway system was the best in the world and recommended it to those who wished to study a model system. He also spoke of highway work in Canada where, he said, they were making extensive investigations, believing it better to investigate before work than after.

The session adjourned at 5 p. m.

Wednesday, December 10.

The third session of the convention was called to order by President Hill at about half-past ten Wednesday forenoon.

Continuing the consideration of the first subject, "Organization," F. L. Cranford, of the Cranford Co., of Brooklyn, N. Y., presented the third formal paper of the convention, "The Relation to Each Other of the Contractor, Engineer and Inspector." The paper was discussed by Major W. W. Crosby, Chief Engineer of the Maryland Geological and Economic Survey; H. W. Durham, Chief Engineer of the Bureau of Highways of the Borough of Manhattan, New York City; Fred E. Ellis, Manager of the Essex Trap Rock & Construction Co., Peabody, Mass., and G. S. Webster, Chief of the Philadelphia Bureau of Surveys. Major Crosby was unable to be present, but sent in a written discussion, which was read by Prof. Arthur H. Blanchard, of Columbia University.

At the close of the discussion of this question President Hill relinquished the chair to the Second Vice President of the Association, W. A. McLean, Chief Engineer and Commissioner, Ontario Public Roads and Highways Commission. Before proceeding with the program, Chairman McLean took occasion to thank President Hill for his remarks on Tuesday, expressing the good will of American road builders, and the American people generally, to the Canadian people. He then introduced Dr. Joseph Hyde Pratt, State Geologist of North Carolina, the next speaker. Dr. Pratt's paper, "Details of Arrangements for the Use of Convict Labor," was illustrated by a chart showing graphically the classification proposed, and was discussed by C. M. Kerr, Assistant Engineer of the State Highway Department of Louisiana, and Dr. Frank Moore, Superintendent of the State Reformatory at Rahway, N. J.

After the taking of a group photograph at the close of the session had been announced, the convention was adjourned until 2:30 p. m.

The afternoon session on Wednesday was called to order at half-past two by President Hill, who introduced as the first speaker, N. Vermilyea, President of the Ontario Good Roads Association. On behalf of the Ontario organization, Mr. Vermilyea extended an invitation to the American Road Builders' Association to hold its eleventh annual convention at Toronto, Ont., in 1914. It was moved, seconded and voted that the invitation be referred to the proper committee.

At the conclusion of Mr. Vermilyea's remarks President Hill introduced Col. Wm. DeH. Washington, of New York, who continued the discussion of the topic of convict labor introduced by Dr. Pratt's paper.

The second of the three general subjects under consideration by the convention—"Construction"—was next taken up. The first paper was entitled "Determination of the Amount of Realignment, Grading and Drainage to be Done in Connection with Road Improvement," and was presented by Chief Engineer S. D. Foster, of the Pennsylvania State Highway Department. R. A. Meeker, State Highway Engineer of New Jersey; James H. MacDonald, former State Highway Commissioner of Connecticut; J. A. Johnston, Division Engineer, Massachusetts Highway Commission, and Dr. Joseph Hyde Pratt, State Geologist of North Carolina, took part in the discussion of Chief Engineer Foster's paper. During Mr. MacDonald's remarks he showed a number of large photographs illustrating the points made, especially the matter of grading.

The next speaker was L. R. Grabill, Superintendent of Suburban Roads, District of Columbia. Mr. Grabill's paper, "Factors Governing a Proper Selection of Road or Street Pavement," was the second under the subject of "Construction" and the last presented at the fourth session. The paper was discussed by Wm. D. Sohier, Chairman of the Massachusetts Highway Commission; W. A. McLean, Chief Engineer and Commissioner, Ontario Public Roads and Highways Commission; R. B. Gage, Chemist, New Jersey Department of Public Roads, and D. B. Goodsell, Assistant Engineer, Bureau of Highways, Borough of Manhattan, New York City.

During the afternoon session President Hill announced that owing to the absence of the delegates appointed to the Resolutions Committee from Ohio and Wisconsin, Jesse Taylor, of Ohio, and State Highway Engineer Hirst, of Wisconsin, had been appointed to that committee as alternates.

The convention adjourned at about 5:30 p. m. until 10:00 a. m. Thursday.

On Wednesday evening many of the A. R. B. A. members and exhibitors were entertained at a theater party as the guests of the citizens of Philadelphia. A block of seats on the lower floor at the Forrest Theater had been reserved for a performance of "The Sunshine Girl" and were distributed to members and exhibitors during the day.

Thursday, December 11.

The fifth session of the convention was called to order at about half-past ten by First Vice President Harold Parker, of the Association. The session was devoted entirely to the presentation of a series of short papers on the construction of various kinds of roads and pavements. In some cases the presentation of the paper was followed by a discussion, but in general the discussion was omitted because of the short time available on account of the automobile inspection trip scheduled for 1:30 p. m. A few of those who had prepared papers were unable to be present, and the papers were either merely read by title or else were read by some one designated by the chair.

The first paper presented was "Bituminous Macadam and Bituminous Concrete," by Linn White, Chief Engineer, Board of South Park Commissioners, Chicago, Ill. As Mr. White was not present the paper was read by George L. Watson, of the Continental Public Works Co. of New York City. After the reading of the paper the subject was discussed briefly by Professor Arthur H. Blanchard, of Columbia University. The next paper, "Earth Roads," was presented by E. A. Kingsley, State Highway Engineer of Arkansas. E. J. Watson, Commissioner of Agriculture, Commerce and Industries of South Carolina, who was scheduled to present a paper on "Sand-Clay Roads," was unable to be present, and Dr. Joseph Hyde Pratt, State Geologist of North Carolina, spoke briefly in his place.

The paper on "Gravel Roads," prepared by George W. Cooley, State Engineer of Minnesota, was read by Major W. W. Crosby, of Baltimore, Md. The next paper, "Concrete Roads," prepared by State Highway Commissioner F. F. Rogers, of Michigan, was read by Col. Wm. DeH. Washington, and was discussed briefly by Major Crosby. A paper on "Wood and Asphalt Block" was read by H. H. Schmidt, Chief Engineer of the Bureau of Highways of Brooklyn, N. Y., and was discussed briefly by Richard L. Lamb, of New York, N. Y., and H. L. Collier, Consulting Engineer of the Yellow Pine Manufacturers' Association.

A paper on "Water Bound Macadam" was read by Jos. W. Hunter, Deputy State Highway Commissioner of Pennsylvania, and was followed by a paper on "Sheet Asphalt," by George H. Norton, Deputy Engineer Commissioner of Buffalo, N. Y. The last paper of the session, "Granite Block," was presented by R. H. Gillespie, Chief Engineer of Highways, Borough of the Bronx, New York, N. Y.

Question 4 under Subject B—"Construction"—which was scheduled for the Thursday session, was, by vote of the meeting, postponed until Friday morning. This action was taken on account of the lateness of the hour and the necessity for making an early start on the automobile inspection trip.

During the meeting Chairman Parker made several announcements, among them being that Major W. W. Crosby had been appointed a member of the Resolutions Committee from the State of Maryland. Announcements were also made of the automobile trip in the afternoon and of the public meeting in the evening.

Thursday afternoon was devoted to an inspection of roads and streets in and near the city, the service test-road on the Byberry and Bensalem Turnpike and the construction work in progress on Northeast Boulevard. The trip was planned by the Bureau of Highways and Streat Cleaning, and was made in about forty automobiles.

Starting from the First Regiment Armory early in the afternoon, the party went over Broad and Spring Garden Sts. to the Fairmount Park entrance, and thence through the park and over various roads and streets to the service test roadway. At the side of each section on the latter there had been erected signs showing the character of the surface and the essential features of the construction. The automobiles were driven slowly over the 26 sections and back to the southern end, stopping to allow delegates desiring to do so to get out and make closer examinations. On the return trip the route led over the Northeast Boulevard, a stop being made to permit an inspection of the work in progress at the northerly end.

The public meeting on Thursday evening, the sixth session of the congress, was held in the ball room of the Bellevue-Stratford Hotel, and was attended by over a thousand delegates and guests. President Samuel Hill called the meeting to order shortly after eight o'clock and introduced as chairman, Director Morris L. Cooke, of the Philadelphia Department of Public Work. The first speaker was Thomas R. McDonnell, of Elkview, Pa., President of the Chester County Supervisors' Association. Mayor Rudolph Blankenburg, of Philadelphia then addressed the meeting and was followed by Representative Dorsey W. Shackleford of Missouri. President Hill made the last address, illustrating it with many lantern slides of American and foreign roads and road work and a series of slides showing scenes in the state of Washington.

Friday, December 12.

The seventh session was called to order by President Hill at about half-past ten Friday forenoon. The first speaker was State Engineer Geo. W. Cooley of Minnesota, who addressed the meeting on earth and gravel roads and on maintenance, paying especial attention to the methods followed in his own state.

At the conclusion of Mr. Cooley's remarks, the fourth topic under "Construction," which had been postponed from the forenoon session on Thursday, was taken up. H. C. Hill, Engineer, Lane Construction Corporation of Meriden, Conn., presented the formal paper—"Unit Price and Lump Sum Contracts and Percentage Work." The topic was discussed by J. J. Ryan, Secretary of the New York Road Builders' Association, and L. W. Duffey of the Indiana Good Roads Association, who took the place assigned to C. A. Kenyon, president of that organization.

The next paper on the program, "The Testing of Materials for Road and Street Construction," was presented by Prevost Hubbard, Chief of the Division of Roads and Pavements of the Institute of Industrial Research, Washington, D. C. It was discussed by J. E. Myers, Chief Chemist of the New York Highway Commission, C. S. Reeve, Chemist of the U. S. Office of Public Roads, P. P. Sharples of the Barrett Mfg. Co. and H. B. Pullar of Pullar and Enzenroth. F. P. Smith, of Dow and Smith, who was also scheduled to discuss Mr. Hubbard's paper, sent in a written discussion.

At this point President Hill was notified that the committee on resolutions was ready to report, and before taking up the next subject the report was read by State Highway Commissioner Rogers of Michigan, the chairman of the committee. The report was adopted as read, and was as follows:

Resolutions

WHEREAS, It is the expressed purpose of the American Road Builders' Association to acquire and disseminate information and to stimulate interest and to promote legislation and other measures in the interest of the building and maintaining of highways; and

WHEREAS, It is increasingly evident that this work can best be accomplished by complete cooperation or amalgamation with other associations working for the same broad purposes; and

WHEREAS, The Federal Congress will in the near future take some action leading to the participation in the building of roads by the government; and in order that such legislation as is enacted should be fair, just and equitable and that the monies that are appropriated should be spent without undue influence of politicians; it is advisable that the road organizations should present a united point of view to Congress.

NOW, THEREFORE, BE IT RESOLVED: That it is the sense of this association that an earnest effort should be made for a complete understanding with such other national road associations as have similar ideas, and, for this purpose, the President of the American Road Builders' Association be and hereby is authorized to appoint a committee of three, of which the President shall be a member and chairman, with full powers to act and to meet with similar committees from other road associations and consider, and, if possible, perfect a complete amalgamation.

RESOLVED FURTHER, That we herewith petition the Congress of the United States to authorize the President to appoint a commission from civil life and make a sufficient appropriation to said commission to enable it to make a thorough investigation of the whole question of federal appropriations for road construction and that this commission shall report its findings to the President.

WHEREAS, There have been held during the past year several national road conventions on elaborate scales, necessitating great expense on the part of delegates and exhibitors; therefore be it

RESOLVED, That it is the opinion of this convention that all national road organizations holding or intending to hold such conventions should unite and next year and succeeding years hold but one annual road congress, and we would suggest that said congress be held during the month of March.

WHEREAS, The rooms assigned for holding the sessions of the road congresses in recent years were wholly unsuited for the purpose, resulting in great annoyance to the dele-

[illegible] thus reducing the value of the congresses, therefore be it:

RESOLVED: That there should be provided in the future halls suitable for holding the sessions of the congresses, far enough removed from the exhibits to be free from confusion and noise.

RESOLVED: That the sincere thanks of this Convention be extended to the Governor of the State, the Mayor and Citizens' Committee of this city for their cordial welcome, and the many courtesies they have extended to us; and to the press of the city for the splendid and extensive manner in which they have reported this Convention.

FRANK F. ROGERS,
Chairman.
JOSEPH HYDE PRATT,
Secretary.

After the adoption of the resolutions, the third general subject, "Maintenance," was taken up. The first paper, "Sub-Organization for Securing Efficient Maintenance," was by John N. Carlisle, Commissioner of Highways of New York. As Commissioner Carlisle was not present, the paper was read by Col. Wm. DeH. Washington, who also spoke briefly and described a motor fruck designed for maintenance work, which is to be tried by the New York Commission. The paper was discussed by C. J. Bennett, State Highway Commissioner of Connecticut; C. W. Ross, Street Commissioner of Newton, Mass.; and J. S. Gillespie, Road Commissioner of Allegheny County, Pa.

President Hill then read a communication from Commissioner W. A. McLean of the Ontario Public Roads and Highways Commission, suggesting the appointment of a permanent committee on legislation. On motion of State Highway Engineer R. A. Meeker of New Jersey, it was voted that such a committee be appointed by the president.

At this point President Hill relinquished the chair to Second Vice President McLean, who called upon George Ward Cook of Haverhill, Mass., President of the Merrimac Valley Improvement Association. Mr. Cook spoke briefly on the subjects of national aid and convict labor, and after Secretary E. L. Powers of the Association had announced the arrangements for the annual dinner on Friday evening the convention adjourned until afternoon.

The eighth and final session was called to order by Third Vice President George W. Tillson shortly after half-past two. The first paper presented, "General Methods of Repairs and Renewals," was written by A. W. Dean, Chief Engineer of the Massachusetts Highway Commission, and, as he was unable to be present at that session, was read by Carl G. Richmond, Resident Engineer of the Massachusetts Highway Commission. The subject was discussed by Paul D. Sargent, Chief Engineer of the Maine State Highway Commission; A. D. Williams, Chief Road Engineer of West Virginia, and H. G. Shirley, Chief Engineer of the Maryland State Roads Commission. Robert C. Terrell, State Commissioner of Public Roads of Kentucky, who was also to have taken part in the discussion, was absent, but sent a paper, which was read by T. A. Hulbert, Associate Editor of "Good Roads."

The last paper of the session, and of the convention, entitled "Bituminous Surface Treatment and Dust Prevention, was read by Wm. H. Connell, Chief of the Bureau of Highways and Street Cleaning of the Philadelphia Department of Public Works. C. W. Ross, Street Commissioner of Newton, Mass., who was scheduled to open the discussion of Mr. Connell's paper, was unable to be present and his paper was read by Mr. Hulbert. The further discussion of the paper was participated in by C. F. Lawton, Superintendent of the Street Department, New Bedford, Mass.; Mr. Connell, Col. Washington; T. J. McGovern, of Trenton, N. J.; L. R. Grabill, Superintendent of Suburban Roads of the District of Columbia; Chief Engineer Shirley of the Maryland State Roads Commission; C. M. Pinckney, Engineer of Maintenance, Bureau of Highways of the Borough of The Bronx, New York City, and others.

After the close of the discussion, W. H. Kershaw, Manager of the Paving and Roads Division of the Texas Co., read a communication from W. A. McLean, a member of the A. R. B. A. committee on standards. In the communication, which was laid before the meeting at the request of the chairman, Nelson P. Lewis, it was stated that the committee had held one meeting; that it had effected a preliminary organization; that the members were of the opinion that a useful service could be performed by such a committee, and that, if it should be the wish of the association to continue the committee, a progress report would be made at the annual meeting. Maj. W. W. Crosby moved that the action of the president in appointing the committee be approved and that the committee be continued. The motion was seconded, put and carried.

The selection of a nominating committee was the last business coming before the congress. W. D. Uhler, Assistant Engineer of the Philadelphia Bureau of Highways and Street Cleaning, moved the appointment of the following: Nelson P. Lewis, Chief Engineer of the Board of Estimate and Apportionment, New York City; John A. Gaffey, Medford, Mass.; F. L. Ford, City Engineer, New Haven, Conn.; J. A. Johnston, Division Engineer, Massachusetts Highway Commission; Geo. W. Cooley, State Engineer of Minnesota; Joseph W. Hunter, Deputy State Highway Commissioner of Pennsylvania, and Wm. H. Connell, Chief of the Bureau of Highways and Street Cleaning of Philadelphia, Pa. The names of these men were put before the meeting and the Secretary directed to cast one ballot for their appointment.

The convention adjourned sine die at about five o'clock.

The last event of the congress was the annual association banquet on Friday evening. It was held in the red room of the Bellevue-Stratford Hotel and was attended by about seventy-five members of the A. R. B. A. and their guests. President Hill acted as toastmaster and speeches were made by J. P. Connelly, Chairman of the Finance Committee of the City of Philadelphia; Geo. W. Tillson, Consulting Engineer to the Borough President, Borough of Brooklyn, New York City; Alexander Lawrence, Jr., Chairman of the Finance Committee of the Congress; James H. MacDonald, former State Highway Commissioner of Connecticut; H. B. Taylor, President of the Philadelphia Society of Engineers; Major W. W. Crosby, Treasurer of the A. R. B. A., and Wm. H. Connell, Chief of the Philadelphia Bureau of Highways and Street Cleaning.

The Waco, Tex., Chamber of Commerce and the Young Men's Business League are working for the improvement of roads in McKinney County and are urging the calling of an election to vote on issuing bonds to the amount of $1,000,000.

Street Paving in Spartanburg, S. C., during 1913 has amounted to 10,960 lin. ft. Only asphaltic concrete has been used in this work. Sidewalk construction has been completed to the amount of 43,953.24 sq. yds. costing $36,481.19. New curbs, 7.26 miles in extent; have been built at a cost of $3,047.66.

Street Paving in Houston, Tex., during the Next Twelve months will cost $800,000. In addition, the city will construct reinforced concrete bridges at a cost of about $400,000. Contracts for the work will range from $2,000 to $100,000 each. Advertisements for these contracts will be placed in local papers, and contractors who desire to bid on the work are advised to have a representative in Houston to look the work over, and to be ready to submit bids. Contracts will be advertised for a period not exceeding two weeks.

The Official Route of the Colorado-to-the-Gulf Highway between Denver, Colo., and Galveston, Tex., has been logged by O. L. Williams, President of the Colorado-to-the-Gulf Highway and others. The route as laid out runs from Galveston to Houston, thence through Harris, Waller, Grimer, Brazos, Robertson, Limestone, Navarro, Ellis and Dallas Counties to the city of Dallas, thence to Fort Worth and from there to Bowie, through Childress and Amarillo, Texas, and Clayton, N. M., to Denver. Signs of enameled steel with blue lettering on a white background and a red arrow pointing to the Gulf are being placed ever five miles along the roads as official marks of the highway.

The Fifth Good Roads Show

The exposition of road and street building machinery, materials and methods at Philadelphia—the fifth of its kind held in conjunction with the annual conventions of the American Road Builders' Association—exceeded in size and variety all previous exhibitions, either at A. R. B. A. or other conventions.

Over one hundred exhibitors made displays, which included all manner of equipment for road and street contractors, engineers' instruments and supplies, materials for road and street construction and maintenance, models of machines and models showing construction methods, photographs of roads and road work, maps, charts, and literature. The majority of the commercial exhibits were shown in the main drill hall of the First Regiment Armory. The remainder, consisting of machinery too large and heavy for display in the building, was accommodated in a large tent, erected on a lot near the Armory, and in the open. The educational, state and city exhibits were made in the small drill hall of the Armory.

The exhibitors were as follows:

Commercial

Acme Road Machinery Co., Frankfort, N. Y.
American [illegible] Co., Philadelphia, Pa.
American Rolling Mill Co., Middletown, O.
Ames Road Co., Easton, Pa.
[illegible] Stone Co., [illegible], Pa.
Association of American Portland Cement Manufacturers, Philadelphia, Pa.
Autocar Co., The, Ardmore, Pa.
Bain Wagon Co., The, Kenosha, Wis.
Baker Co., The R. D., Detroit, Mich.
Barber Asphalt Paving Co., The, Philadelphia, Pa.
Barrett Mfg. Co., New York, N. Y.
Bausch & Lomb Optical Co., Rochester, N. Y.
"Better Roads," Jamestown, O.
[illegible] & [illegible], New York, N. Y.
Bucyrus Co., South Milwaukee, Wis.
Buff & Buff Mfg. Co., New York, N. Y.
Buffalo Pitts Co., The, Buffalo, N. Y.
[illegible] Co., The E. E., New York, N. Y.
Carey Co., The Philip, Cincinnati, O.
Case Threshing Machine Co., The J. I., Racine, Wis.
Champion Wagon Co., The, Owego, N. Y.
Clip Bar Mfg. Co., Philadelphia, Pa.
[illegible] Wagon Co., [illegible]
Concrete-Cement Age, Detroit, Mich.
Concrete Form & Engine Co., Detroit, Mich.
[illegible] Paving Co., New York, N. Y.
Dunn Wire-Cut-Lug Brick Co., The, Conneaut, O.
[illegible] Roads Co., The, [illegible], N. J.
Eagle Wagon Works Co., The, Auburn, N. Y.
"Engineering News," New York, N. Y.
"Engineering Record," New York, N. Y.
Farquhar Co., Ltd., The A. B., York, Pa.
Frick Co., The, Waynesboro, Pa.
Galion Iron Works Co., The, Galion, O.
"Good Roads," New York, N. Y.
Good Roads Machinery Co., Inc., The, Kennett Square, Pa.
Gurley, W. & L. E., Troy, N. Y.
Hartranft Cement Co., The Wm. G., Philadelphia, Pa.
Hassam Paving Co., Worcester, Mass.
Headley Good Roads Co., Philadelphia, Pa.
Huber Mfg. Co., The, Marion, O.
Hunt & Co., Robert W., Chicago, Ill.
Hvass & Co., Chas., New York, N. Y.
Ingersoll-Rand Co., The, New York, N. Y.
[illegible] Mfg. Co., Beaver Falls, Pa.
Iroquois Works, Barber Asphalt Paving Co., Buffalo, N. Y.
[illegible]-Wright Co., The, Toledo, O.
Kent Machine Co., Kent, O.
Kentucky Wagon Mfg. Co., Louisville, Ky.
Keuffel & Esser Co., Hoboken, N. J.
Knickerbocker Co., The, Jackson, Mich.
Knox Automobile Co., The, Springfield, Mass.
Koehring Machine Co., Milwaukee, Wis.
[illegible] & [illegible], Philadelphia, Pa.
[illegible] Company, Lansing, Mich.
Link-Belt Co., The, Philadelphia, Pa.
Locomobile Co. of America, The, Bridgeport, Conn.
McAvoy Vitrified Brick Co., The, Philadelphia, Pa.
Marion Steam Shovel Co., The, Marion, O.
[illegible] & [illegible] Co., [illegible], Pa.
Milburn Co., The Alexander, Baltimore, Md.
[illegible], John H., Philadelphia, Pa.
Municipal Engineering & Contracting Co., Chicago, Ill.
"Municipal Journal," New York, N. Y.
National [illegible] Co., West [illegible], Cal.
National Paving Brick Manufacturers Association, The, Cleveland, O.
Oliver Chilled Plow Works, South Bend, Ind.
Packard Motor Car Co. of Philadelphia, The, Philadelphia, Pa.
[illegible] Co., The H. W., [illegible]
Pittsburgh Testing Laboratory, The, Pittsburgh, Pa.
[illegible] Mixer Co., The, [illegible], Mass.
Robeson Process Co., The, Pennington, N. J.
[illegible], T. M., Chicago, Ill.
[illegible] Co., [illegible], Pa.
[illegible] & [illegible], Philadelphia, Pa.
[illegible] Self-Locking [illegible] Co., The, [illegible], O.
[illegible] Products Co., The, [illegible], Pa.
Standard Oil Co. of New York, The, New York, N. Y.
[illegible] Portland Cement Co., Philadelphia, Pa.
[illegible] Mfg. Co., Saratoga Springs, N. Y.
Texas Co., The, New York, N. Y.
Thew Automatic Shovel Co., The, Lorain, O.
Troy Wagon Works Co., The, Troy, O.
Trussed Concrete Steel Co., Detroit, Mich.
United Gas Improvement Co., The, Philadelphia, Pa.
Union Iron Works, Hoboken, N. J.
United States Asphalt Refining Co., The, New York, N. Y.
United States Wood Preserving Co., The, New York, N. Y.
Universal Portland Cement Co., The, Chicago, Ill.
Universal Road Machinery Co., The, Kingston, N. Y.
Van [illegible], Roys & Co., Columbus, O.
Waring-Underwood Co., The, Philadelphia, Pa.
Warner-Quinlan Asphalt Co., The, New York, N. Y.
Warren Bros. Co., The, Boston, Mass.
Warren-Knight Co., The, Philadelphia, Pa.
Waterloo Cement Machinery Corporation, The, Waterloo, Ia.
Watson Wagon Co., The, Canastota, N. Y.
Wheeling Corrugating Co., The, Wheeling, W. Va.
Wheeling Mold & Foundry Co., The, Wheeling, W. Va.
Wiard Plow Co., The, Batavia, N. Y.
Yellow Pine Manufacturers' Association, The, St. Louis, Mo.

Non-Commercial

State of Colorado.
State of Kentucky.
State of Massachusetts
State of New Jersey.
State of New York.
State of North Carolina.
State of Washington.
State of Rhode Island.
Territory of Alaska.
Province of Ontario, Canada.
City of New York.
City of Philadelphia.
Columbia University
University of Pennsylvania.
U. S. Dept. of Agriculture, Office of Public Roads.

The Park Commissioners of San Angelo, Tex., are planning the establishment of a driveway along the North Concho River within the city limits. It is proposed to use a strip of land 75 ft. wide on each side of the river.

The State Highway Commission of Wisconsin has received application from counties for state aid to the amount of $1,500,000 for the construction of public roads next year. The amount available for apportionment among the counties is $[illegible].

Bond Issues for Paving and Bridge construction in Houston, Tex., have been approved by the Attorney General's Department of that state. Two separate issues, one of $600,000, for paving and the other of $[illegible], for bridges, were recently authorized by the voters of the city.

The County Commissioners of Lewis County, Wash., have decided to improve the public highway between Chehalis and Centralia next summer. The road will be graded to a width of [illegible] ft., and paved with some hard material to a width of [illegible] ft. The road is now graded to a width of [illegible] ft.

The City Council of Buffalo, N. Y., has approved a plan for the construction of a new thoroughfare across the property of the Buffalo Orphan Asylum at Elmwood Ave. and Virginia St. The plan also includes the straightening of curves where North Elmwood Ave. joins South Elmwood Ave.

A Bond Issue of $100,000, recently authorized in Road District No. 1, Montgomery County, Tex., has been sold, and it is expected that work of improving the highways of the district will soon start.

The Commissioners' Court, of Coryell County, Tex., has ordered that all road overseers comply with the old law requiring that they erect sign posts at every mile on the public roads in their districts showing the exact distance to the county seat or prominent town to which the roads lead. Automobilists are trying to have this law enforced in every county.

The Board of County Commissioners of Pottawatomie County, Kan., has designated for improvement 125 miles of the roads of the county. These roads will be taken over by the county as fast as the townships bring them up to the standard which has been set by the commissioners. Among those included in the list are the Golden Belt and the Blue Valley Roads.

A New Automobile Road Between El Paso, Tex., and Artesia, N. M., has been practically completed. It is 165 miles long, and is said to be [illegible] miles shorter than the old route through the Mescalero Reservation. The new roads runs out of El Paso by way of the Hueco tanks through Russell Gap between the Sacramento and Guadalupe mountain ranges, thence through Hope to Artesia. The highest elevation of the road is [illegible] ft., which is [illegible] ft. less than that of the old route. The new road will be marked at intervals by [illegible] signboards giving distances and directions, and erected on iron posts.

COMING MEETINGS

January 26-27.—Texas Good Roads Association.—Annual meeting, Fort Worth. Secretary, Homer D. Wade, Stamford, Tex.

February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

NEWS OF THE TRADE

The Wood Drill Works, 5108-5110 West Lake St., Chicago, Ill., has issued a 31-page booklet, together with two folders, descriptive of the Wood rock drills and mining machinery. In the text attention is drawn to the success of the 3 ⅝-in. rock drill, which was used on the Panama Canal and in other large engineering enterprises, and to the increased demand for light compact machines, drilling to a depth of over 30 ft., which has resulted in placing upon the market the new No. 5 model, having a capacity of 50 ft., and drilling a hole 4 ins. in diameter.

The Wheeling Mold and Foundry Co., of Wheeling, W. Va., has issued an attractive catalogue, describing the construction and operation of the Wheeling "Forced Feed" crusher, and the various sizes and combinations of this machine. The booklet also contains instructions for operating the crusher. Besides the reading matter, the catalogue, which is 8½ by 11 inches in size, contains many photographs of the company's road machinery.

REPORTS

REPORT OF THE NEW YORK STATE COMMISSION OF HIGHWAYS, for the year ending December 31, 1912.—Cloth; 6x9 ins., 694 pp.; illustrated.

This report, covering the work of the State Highway Commission during 1912, was submitted to the Legislature in February, 1913, by C. Gordon Reel, John A. Bensel and Duncan W. Peck, Commissioners, and has recently been issued in book form. It comprises a brief report by the commission and 21 appendices, each taking up a different phase of the work in detail. Among the appendices are the reports of the first and second deputies covering the maintenance and repair of state and county highways and the work of the Bureau of Town Highways, respectively. Several of the appendices consist principally of tabular statements, among these being Appendix B, in which is included tables of cost data on oiling work in 1910, 1911 and 1912; Appendix D, showing data on town highways and bridges in each town in the state; Appendix E, showing expenditures for town highways and town bridges; Appendix F, showing the expenditures by the department for all purposes; Appendix I, showing bids received and awards made for the improvement of state and county highways and for highway repairing during 1912; Appendix Q, showing detailed data on roads completed between Jan. 1, 1898, and Jan. 1, 1913, and roads under contract at the date of the report; Appendices R and S, showing state and county highways completed, under contract and awaiting contract, one arranged numerically and the other according to counties; Appendix T, showing county highways awaiting contract at the date of the report; Appendix U, showing construction contracts in force Dec. 31, 1912, and Appendix V, showing repair and reconstruction contracts from Jan. 1, 1912, to Jan. 1, 1913. The frontispiece shows the exhibit of the New York State Highway Department at the convention of the American Road Builders' Association at Cincinnati in December, 1912. The other illustrations show improved roads under construction and completed.

Roane County, Tenn., Will Spend $130,000 in the near future in improving its roads, bonds for that amount having been sold to a Chicago firm.

The Corsicana Good Roads Club has been organized in Corsicana, Tex., for the purpose of furthering the good roads movement in that section. J. W. Story is President and W. L. Bailey is Secretary.

The County Commissioners of Luzerne County, Penn., have decided to issue bonds to the amount of $350,000, of which a large portion will be used for the construction of new roads and the Pittston bridge. As planned at present, $160,000 will be used for roads and $90,000 for the construction of the bridge.

With the completion of the paving on Union St., the city of Warsaw, Ind., has now nine miles of paving within the city limits. It is said that for its size Warsaw has a more comprehensive highway system than any city in Indiana. The street just completed will be opened to traffic shortly.

The Name of the Indiana Division of the Transcontinental Highway Association has been changed to the Northern Indiana Lincoln Highway Association. The new organization includes ten towns and cities in the northern part of the state, namely, Ligonier, Goshen, Elkhart, Miskawaka, South Bend, New Carlisle, Rolling Prairie, Laporte, Valparaiso and Hobart.

Of the Proceeds of the Sale of Municipal Bonds, indorsed by the voters of Philadelphia, Pa., at the recent election, amounting in all to $8,600,000, $1,800,000 will be used for the abolition of grade crossings, $200,000 for the construction of new bridges, $550,000 for the repaving and resurfacing of roads, $250,000 for the Delaware Ave. improvement, and $1,000,000 for parkway extension.

Bonds to the Amount of $300,000 have been voted in Contra Costa County, Cal., the proceeds to be used in constructing a state highway down the bay shore to Richmond, to connect there with San Pablo Ave. Plans are also being prepared by City Engineer Chapman for improving that part of San Pablo within the city limits. Richmond Ave. will be paved with asphalt for a distance of a mile and a half.

At a Recent Meeting of the City Officials and the Association of Commerce of St. Paul, Minn., a tentative program for road work to be done in 1914 was decided upon. The plans, which involve approximately 500,000 sq. yds. of paving, include the following: Completion of work ordered but not finished this year, 129,450 yds.; work reported favorably by Board of Public Works, but for which material has not been selected, 128,575 yds.; work for which preliminary orders have been issued but no hearings held, 231,374 yds.; total, 499,400.

Extending the Macadamizing of the Cajon Pass Road through San Bernardino County, Cal., to the summit of the mountain range has been tentatively agreed upon by the county commissioners and supervisors. In addition, the commissioners have agreed to improve Mill St. in the city of San Bernardino, east to Sterling or Mountain Ave., thence south to Colton Ave., and east on Colton Ave. to Redlands, establishing a new route between San Bernardino and Redlands. The improvements are contingent upon the voting of bonds in the sum of $1,500,000, at the election to be held Dec. 17.

Figures on Grade Crossing Accidents in France, given in a recent issue of the "Daily Consular and Trade Reports," show that during last year (1912) 88 persons were fatally injured and 54 persons sustained more or less serious injuries in grade crossing accidents on six of the principal railway systems. Horse-drawn vehicles, automobiles and trolley cars figured in 30 of the accidents, and the pedestrians killed numbered 76 and those injured 18. The total number of grade crossings existing on the six systems concerned was 34,981. According to the French Ministry of Public Works which has supervision over the railway systems, every effort is being made to reduce the number of grade crossings. At present there are almost none in the city of Paris, and special efforts are being made to eliminate the crossings in the vicinity of all groups of dwellings.

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Copy for advertisements of which proofs are to be submitted to advertisers should reach the New York office as follows: For insertion in the first issue of the month, by the fifteenth of the preceding month; for other issues, by noon on Thursday of the week before date of issue.

Copy for all advertisements of which proofs need not be submitted—including "Proposal," "For Sale," "Want" and other classified advertisements—will be accepted until noon on Thursday of the week of issue.

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Proposed State Aid Highways in Sangamon County, Illinois

Plans for a comprehensive system of state aid highways in Sangamon County, Ill., have been prepared by a committee appointed by the Board of County Supervisors to confer with State Highway Engineer A. N. Johnson.

If the plans are approved by the board, every city, town and village in the county will, within a period of two years, be connected with Springfield, while this city will be connected with the principal towns and county seats of the surrounding counties by main roads.

According to the committee preparing the plans, which consists of Supervisors D. V. White, H. R. Hall and William Booth, Sangamon County will eventually have 280 miles of state aid roads. These roads will be improved and maintained at equal cost to the state and county, and will be under the direct supervision of the state highway department.

The routes as now outlined comprise 220 miles of the 280 miles of state aid roads allotted to Sangamon County. The remaining 60 miles have not yet been mapped out. Those for which plans have already been prepared are designed to give the shortest possible routes to the various cities and villages in the county.

The routes prepared so far are as follows: Chinkapin Hill road to Athens, connecting with Menard County road for Petersburg; Peoria road north; a road from Peoria to Sherman, thence to Williamsville and north to connect with Logan County road to Lincoln; Riverton road from fair grounds east through Riverton, Buffalo, Lanesville and Illiopolis, connecting with Macon County road to Decatur; Rochester road to Rochester and Burkhart, connecting with Christian County road to Taylorville; road from Rochester to New City, Cascade and Taylorville; Sixth St. road, Cotton Hill, Beamington, New City, Cascade and Taylorville; Sixth St. road south to Cotton Hill, Glenarm, Divernon, Pawnee, connecting with the Montgomery County road to Litchfield; Country Club road to Chatham, Auburn, Thayer and connecting with Macoupin County road to Carlinville; road from Chatham west to county line, connecting with Morgan County road to Jacksonville; Lawrence Ave. road west from Washington Park to Riddle Hill, Berlin and Jacksonville; Jefferson St. road west through Bradfordton, Pleasant Plains, and connecting with the Cass County road to Virginia and Beardstown.

Dedication of First State Highway in South Dakota

At a meeting of the State Highway Commission held at Salem, S. D., on Nov. 28, and attended by delegates and citizens from various towns along the route, State Highway No. 1 was officially designated and dedicated. This highway runs from Sioux Falls northwesterly through the towns of Hartford, Humboldt, Montrose, Salem and Howard to Iroquois, where it joins the so-called Red and Yellow Trail, which also will shortly be designated a state highway.

Among the speakers was E. C. Issenhuth, Chairman of the State Highway Commission, who spoke relative to the growing sentiment favoring good roads and the many advantages to be derived from an adequate system of highways. He also offered many suggestions for the furtherance of the good roads movement. Frank M. Byrne, Governor of South Dakota, followed Commissioner Issenhuth, speaking on the necessity of better roads and the feasibility of convict labor.

The last speaker was N. O. Monserud, Member of the State Highway Commission. He called attention to the importance of the gathering and its purpose; he dwelt briefly on the highway movement and its importance in the development of the state and the nation, and also called attention to what the good roads movement means in the betterment of farm life and rural conditions, as well as to the advantages to be gained for churches and schools. Mr. Monserud then officially dedicated the new road in the name of South Dakota, as the first state highway in the state.

Road Work in Maricopa County, Arizona

A $1,250,000 good roads bond issue will be submitted to the voters of Maricopa County, Ariz., and, pending the result of this, a mile of concrete pavement will be laid between the city limits and Salt River, at a cost of $9,000 in order to determine the desirability of concrete in the construction of the proposed roads.

At a recent conference between the Board of Supervisors and representatives of commercial organizations in the county, resolutions were passed asking the supervisors to appoint an advisory highway commission and settle upon a date for the bond election. Acting upon this resolution, the board has appointed as the advisory committee seven citizens representing various sections of the county, as follows: W. S. Humbert, W. P. Lount, of Phoenix; J. J. Casey, of Christy Road; Grant Jones, of Temple; O. S. Stapley, of Mesa; T. N. Clanton, of Buckeye; Sam Stout, of Glendale.

Appointment of an A. R. B. A. Committee on Amalgamation

President Samuel Hill of the American Road Builders' Association has appointed Geo. W. Tillson, Consulting Engineer to the President of the Borough of Brooklyn, New York City, and Third Vice President of the A. R. B. A., E. L. Powers, Editor of "Good Roads," and Secretary of the A. R. B. A., and R. A. Meeker, State Highway Engineer of New Jersey, and a director of the A. R. B. A., members of the Association's committee on amalgamation, thus making the membership of this committee the same as of the present executive committee.

This action has been taken in accordance with one of the clauses of the resolutions adopted at the Philadelphia congress held on the 9th, 10th, 11th and 12th of this month. The clause referred to set forth that it was the sense of the association that the president should appoint a committee of three, of which he should be a member and chairman, "with full powers to act and to meet with similar committees from other road associations and consider and, if possible, perfect a complete amalgamation." President Hill, being unable to give the necessary time to the work of the committee, appointed Vice President Tillson to serve in his place as chairman.

Deposits of Paving Material Near San Antonio, Texas

A. H. Muir, in a paper read recently before the Scientific Society of San Antonio, Tex., announced that in Uvalde County, near the line of the Southern Pacific Railroad, there are large deposits of nephelite basalt, said to be one of the best trap rocks. It is a dense, heavy and tough black rock of volcanic origin, and in mineral composition is a combination of several heavy basic silicates, together with a small proportion of magnetite.

A sample of the Uvalde deposits tested by the United States Office of Public Roads gave the following analysis:

Weight per cu. ft.	193. lbs.
Water absorbed per cu. ft.	0.39 lbs.
Per cent. of wear	1.8
French coefficient of wear	22.2
Hardness	17.5
Toughness	15.
Cementing value	Good

Mr. Muir states that these deposits will furnish a practically inexhaustible supply, and also that the quality of the rock is uniformly good and free from strata or pockets of objectionable materials.

Shell Macadam in Caroline County, Maryland

The State Roads Commission of Maryland has decided to use a type of shell macadam in the construction of roads under the state aid plan in Caroline County. It is expected, according to reports, that by using this type of construction the cost of the proposed work in the county will be decreased at least one-third, while, for all practical purposes, the construction will be as satisfactory as the more expensive methods now used on state aid roads.

For some time the construction of state aid highways in the county with shell macadam has been under consideration by the State Roads Commission. One of the first roads to be built by this method is a section 1½ miles long, extending from Bridgeport towards Goldsboro, in the upper section of the county. In a letter from Road Engineer Waldorf of Caroline County to Chief Engineer Shirley, of the State Roads Commission, urging the adoption of the shell macadam type of road construction, Mr. Waldorf states that the roads constructed at the expense of the county by this method have cost from $2,000 to $4,000 a mile less than the roads built by state aid and have been equally, if not more, serviceable; especially is this true of roads constructed in the vicinity of Federalsburg, where the county built roads are in better condition than those built by state aid, although the latter were nearly all resurfaced last season.

One of the features of the county methods of road construction is making the depth of the shells 10 ins. and allowing the road to compact under traffic, instead of having a depth of 16 ins. of shell rolled down to 8 ins. The width of the roadway is also reduced from 12 to 10 ft. It is said that the 10-in. loose shell road is adequate for the traffic conditions in this section of the state, while it permits the work of construction to proceed much more rapidly. In the county method of construction the subgrade is left flat, the shells are spread on the roadbed, the shoulders brought up to the edges of the roadbed and the ditches opened with the road machine. After being exposed to traffic for a while, the road is dragged, each passage of the drag bringing sand on the macadam.

It is claimed that a road built in this manner can be maintained for a long time merely by a fresh dressing of shells from time to time where needed.

The Commissioners' Court of Hunt County, Tex., has ordered an election to be held on Dec. 27, to vote on issuing bonds amounting to $400,000. The proceeds will be used for the construction of approximately 80 miles of roads.

The Empire Zinc Co., of Silver Lake, N. M., which has recently purchased large properties in the Pinos Altos District, is considering the construction of a highway from Silver Lake to its mines in order to facilitate the transportation of the ores.

A bill providing for a grant by the federal government of 500,000 acres of land to the states of Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Utah and Wyoming, which when sold would provide money for highway improvement, was recently introduced into Congress by Senator Warren.

Several hundred citizens of Morgan County, Mo., have incorporated under the name of the Morgan County Road Builders' Company of Versailles, with a capital of $6,000. The company will buy, own and operate traction engines, road graders and other machinery for the building of highways in Morgan County. Among the incorporators are: A. L. Ross, H. A. Young and F. A. White.

The Commissioners of Dade County, Fla., decided at a recent meeting that extensive road tests, under the supervision of W. J. R. Weis, government expert, would be conducted on that section of Biscayne Drive, lying north of Buena Vista, between that suburb and Deering Place. The substances to be experimented with are road oils and calcium chloride.

At the Quarterly Session of the Pomona Grange held recently in Stanton, Del., and attended by members of the various granges in New Castle County, resolutions were passed favoring more extended experiments with gravel road construction in the county. The resolution stated that while the Grange favored the construction of state highways and other principal thoroughfares of stone, it considered the construction and maintenance of such roads too expensive for lightly traveled roads.

The Proposed Military Highway along the Rio Grande, from Del Rio to Brownsville, will be mapped and logged by Col. A. L. Westgard, Vice-President of the National Highways Association, according to the present plans of John W. Warren, President of the Texas Good Roads Association, and D. E. Colp, Secretary of the San Antonio Highway League. It is planned to form a party consisting of about twelve automobiles, which will go over the proposed route. The country will be carefully mapped and estimates of the proposed road will then be prepared.

Twenty owners of property on Loucks Ave., Peoria, Ill., recently met with the streets committee of the City Council and agreed to pay for a 25-ft. concrete and brick roadway on that avenue, between Elizabeth St. and University Ave., provided the city would do its share towards making the thoroughfare a county highway. The offer was unanimously accepted by the committee and the whole proposal is now before the City Council. This will place the city in a position to have one thoroughfare extending directly to one of the highways—probably the Knoxville Road—for which state aid can be asked.

Proposed Improvements in Columbus, Ohio

The first step towards the improvement of High St., between Livingston Ave. and the Union Station viaduct, was taken recently when three ordinances calling for appropriations amounting to $150,000, to cover the city's share in the proposed work, were introduced into the City Council of Columbus, O.

The plans and specifications for the repaving and improving of the thoroughfare specify that either wood block or asphalt may be used. According to Service Director Kinnear, abutting property owners will decide, to a great extent, which material they prefer. At the present time the balance of sentiment is in favor of the latter material. The total cost of paving High St. will amount to approximately $120,000, of which sum the cost to the city, should the pavement be asphalt, will amount to $90,000. This is 65 per cent. of the actual cost, and about two-thirds of the estimated cost of the city's share should wood block be used. The Columbia Railway & Light Co. and property holders, benefiting by the proposed improvement, will bear the balance of the construction cost.

Reports of Road Construction in New Jersey

According to the report of Col. Edwin A. Stevens, State Road Commissioner of New Jersey, nearly 151 miles of roads were built in the state during the fiscal year ending Oct. 31, which is over 40 per cent. more than was built during the previous year, and almost double the mileage built during the year before. During the years 1902 and 1903, 154 and 152 miles, respectively, were constructed.

According to the report, the cost of road construction in New Jersey during the fiscal year amounted to $1,488,141.66, of which sum the state paid $521,375.88. The report also contains a table showing that $1,470,035.99 was spent during the year in road repair from the county funds and receipts from automobile registration, bringing the maintenance and construction cost up to $2,958,177.65.

In his report Col. Stevens draws attention to the fact that there are 15,000 miles of roads in the state, 10,500 of which are unimproved. According to the report, the sum of $80,000 would be necessary to improve these highways.

In speaking of bond issues for road improvement, Col. Stevens, in his report, said:

"As to a bond issue, it can be shown that in the case of a $10,000,000 issue, to be spent in ten years in the construction of roads, costing on the average of $10,000 per mile for construction and $500 a mile per year for maintenance, the total charge, including the sinking fund, interest and repairs, would be slightly over $34,000,000, or at an average rate of $850,000 per year. If the amount be set aside each and every year and applied, first to the maintenance of roads already built, and then to new work, an equivalent mileage could be constructed in a little less than 17 years, and maintained for the whole period at a total cost of about $25,000,000, a saving of $9,000,000. If the same amount ($850,000 a year) were to be spent for the quarter-year period, the mileage could be increased 50 per cent. over that resulting from the bond issue."

Collection of Bridge and Paving Toll in Bavaria

One of the principal sources of revenue in Bavaria, according to a report in a recent number of the "Daily Consular and Trade Reports," is the paving and bridge toll. The collection of this is enforced in practically every municipality, despite the fact that for some years past many local organizations have been formed all over Germany with the express purpose of putting an end to the tax in order that tourists may be attracted to the various cities and towns.

On nearly every highway leading into the cities toll stations are located, and here all vehicles, whether they be used for pleasure or commercial purposes, and in many cases bicycles and motorcycles, must stop until the toll fixed by the authorities of each municipality is paid. In the city of Nuremberg, organizations opposed to the infliction of toll have, to a certain extent, succeeded in having the tax abolished. This is not the case, however, in the surrounding municipalities, where a charge of 40 and 80 pfennigs is still made.

All pleasure vehicles owned outside the city of Nuremberg may pass in and out of the city free, while vehicles of all descriptions owned by persons living in the city must pay an annual tax. All freight vehicles and draft animals owned outside the city must still pay toll.

During the year 1912, a sum of $46,157 was the total collection of bridges and paving toll in Nuremberg, as compared with $45,038 in 1911 and $42,964 in 1910. During 1912, freight automobiles paid $6,247 of the annual income. For the collection of this toll a central office and 22 toll stations on roads leading into the city are maintained by the municipal authorities.

Large incomes are realized by the smaller towns, especially those situated upon the main thoroughfares. It is said that these toll stations have, in many instances, acted as a check to the speed with which automobiles travel in the narrow streets.

The Board of Trade, of Commerce, Tex., has inaugurated a campaign for an election to vote on issuing bonds to the amount of $200,000 for road work.

The Mobile Chamber of Commerce, of Mobile, Ala., in connection with the County Board of Revenue and the Road Commissioners, has taken steps towards the purchase of the Mobile Bay Shell Road, with the view of making it a public highway. This old toll road is now owned by the Bay Shell Road Co., a corporation still theoretically in existence.

City Engineer Oscar Claussen of St. Paul, Minn., has prepared tentative estimates for paving in the district lying between Dale St. and the western city limits on University Ave., and has submitted them to the Board of Public Works. The estimates of the total cost of the improvement with different materials are as follows: Sand-lime brick, $434,309.50; granite, $425,911.25; sandstone, $379,921.25; 4-in. creosoted blocks, $357,525.50; 3½-in. creosoted blocks, $332,330.75; brick, $277,142.25; asphaltic concrete, $239,950; asphaltic macadam, $202,757.75; macadam, $172,764.

MEETINGS

Klamath Good Roads Association

The Klamath Good Roads Association held a meeting recently in Klamath Falls, Ore., at which the report of the special committee, appointed to recommend the apportionment of the proposed $320,000 bond issue for road construction, was read.

The committee recommended that the money be divided as follows: Klamath Falls to California line, via Worden and Keno, $58,000; Klamath Falls to Midland, via Second St., $32,000; Klamath Falls to California line, via Merrill and Malin (with agreement that $15,000 be spent south of Malin), $70,000; Klamath Falls to head of Langel Valley, via Olene, Dairy and Bonanza, $70,000; Klamath Falls to Cook County line, via west side of upper Klamath lake and Fort Klamath, $70,000.

The committee consisted of J. O. Hamaker, of Bonanza, Chairman; J. T. Paddoc, of Lorella; Abel Ady, of Midland; F. T. Nelson, of Keno; James Pelton, of Fort Klamath; J. Frank Adams, of Merrill; Charles McCumber, of Dairy; R. A. Emmit, of Klamath Falls, and Catherine Prehm, of Malin.

George A. Lansberry, organizer of the National Highways Association of Division No. 2, was the principal speaker at a good roads meeting held recently in Perry, Kan. At the suggestion of Mr. Lansberry a new organization, consisting of 25 members, was formed.

The Vincennes and St. Louis Good Roads Association held a meeting on Dec. 8 at Carlyle, Ill. There were several well-known speakers present, including Walter C. Shoupe, Secretary of the association, and Homer Tice, who spoke on the importance of an adequate highway system.

At a recent meeting held in Strafford, Mo., the citizens of road district No. 17 organized a good roads society. A discussion on the purposes of the new organization and the use to which it could be put in furthering the good roads movement in Greene County was given by John Walter. The following officers were elected: G. C. Kepley, President; T. J. Bass, Vice President, and C. A. Banta, Secretary.

At a recent meeting held in Redondo Beach, Cal., representatives of the Redondo Beach Good Roads Association conferred with the chambers of commerce of Long Beach, Wilmington and San Pedro, in order to obtain the cooperation of these bodies in the association's plan to have the county supervisors appropriate sufficient money with which to improve a strip of the proposed road, between the northern line of Manhattan and Play del Rey.

The Precinct Good Roads Association, of Temple, Tex., held a meeting recently in the Temple opera house, and elected the following officers: John G. McKay, President; Ray R. Campbell, Vice President; B. B. Buckridge, Secretary; Charles M. Campbell, Treasurer. An executive committee, consisting of one member from each voting precinct in Justice Precinct No. 5, of Bell County, was also appointed. The object of the association is to map a road improvement district and launch a campaign for a $500,000 bond issue.

COMING MEETINGS

January 26-27.—Texas Good Roads Association.—Annual meeting, Fort Worth. Secretary, Homer D. Wade, Stamford, Tex.

February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

February 16-20, 1914.—National Conference on Concrete Road Building.—Auditorium Hotel, Chicago, Ill. Secretary, J. P. Beck, 72 West Adams St., Chicago, Ill.

The holding of a good roads convention in Greenwood, Miss., was the object of a conference which recently took place between the Greenwood Business League and the Supervisors of Tallahatchie, Carroll, Holmes, Madison and Leflore Counties. The purpose of the proposed convention, which will be attended by supervisors and delegates not members of the county boards, but to be appointed by them, will be to promote interest in the construction of a main highway between the northern part of the state and Jackson, Miss. At the meeting of the supervisors the following citizens were appointed as delegates to the convention: Edward Jones, W. J. Brown, O. F. Bledsoe, Jr., J. E. Talbert, J. G. Pleasants, D. S. Jones, Douglas Robinson, W. A. Swift, W. G. Poindexter, A. Henderson, W. H. Rucker, J. W. Bradford, T. H. Baird, E. M. Puchell and S. R. Keesler.

PERSONAL NOTES

Alfred H. Terry has been appointed City Engineer of Bridgeport, Conn.

George C. Fairclo, of Champaign, Ill., has been appointed Superintendent of Highways of Champaign County, Ill.

George Wiard, of the Wiard Plow Co., of Batavia, N. Y., died suddenly at his home on Thursday, Dec. 11, at the age of 81 years.

R. A. Dillon has resigned as Superintendent of Streets and Sewers of Cairo, Ill., in order to resume his former connection with the Cairo Electric Light Co.

P. St. J. Wilson has resigned as State Highway Commissioner of Virginia, in order to accept the position of Assistant Director of the U. S. Office of Public Roads. He is succeeded by George P. Coleman, formerly Assistant Highway Engineer of Virginia.

A. L. Westgard, Vice President of the National Highways Association, has returned to New York, after spending some time inspecting and logging roads in Texas. According to Mr. Westgard's present schedule, he will return to Texas next spring and work northward as the season advances.

Terrell Bartlett has been appointed by the Commissioners of Bexar County, Tex., consulting engineer to the county to supervise the expenditure of $200,000, recently voted in bonds for bridge construction. Active construction work will be started as soon as the bonds are approved by the Attorney General.

William C. Reeder, Assistant Engineer in the Bureau of Highways of Philadelphia, Pa., was recently appointed Assistant Director of Public Works at a salary of $4,000 per year. Mr. Reeder succeeds Lieutenant James Reed, who has been Assistant Director of Public Works since the early days of the present administration.

NEWS OF THE TRADE

The Buffalo Steam Roller Co., of Buffalo, N. Y., has opened a new office at 145 South Spring St., Los Angeles, Cal.

T. C. Loder, 612 Empire Building, Philadelphia, Pa., formerly Philadelphia manager, and recently Chicago manager of the Kelly-Springfield Road Roller Co., has resigned his position in order that he may devote his entire attention to his road machinery interests in the East.

John Wilmer Garland, of Buffalo, N. Y., has incorporated with a capital stock of $10,000 to do a contracting and road construction business. The directors of the new company are: John W. Garland; Fred B. Griffen, of Buffalo, and R. Stanley Ruthven, of Buffalo.

Representatives of the Koehring Machine Co. in its Eastern offices held a reunion in Philadelphia, Pa., on the 10th, 11th and 12th of this month. At a banquet at the Engineers' Club on the evening of the 10th a critical discussion was held and at the banquet at the Hotel Vendig the next evening several practical talks were given by representatives from different offices of the company. At the latter banquet Philip Koehring, President of the company, was presented with a loving cup from his agents, and responded with a history of the firm's development.

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Highway Work in St. Clair County, Illinois

The State Highway Commission of Illinois has prepared a tentative list of roads to be built in St. Cair County under the new Tice road law. According to D. O. Thomas, County Highway Engineer, more than 200 miles of improved highways will be constructed, the cost of which will be borne equally by the state and county. It has not yet been determined what material will be used, but it is probable that water-bound macadam, costing between $5,000 and $8,000 a mile, will be selected.

The list of roads to be built incudes the following: Belleville to Colinsville; a road from the Clinton County line through Summerfield, Lebanon, O'Fallon, Belleville and Millstadt, to the Monroe County line; Belleville to Mascoutah and east to the Madison County line; Belleville through Freeburg, New Athens and Marissa, to the Randolph County line; Fayetteville through Mascoutah and Lebanon to the Madison County line; Freeburg through St. Liberty to Washington County; Belleville through Smithton to Monroe County line; Freeburg through Darmstadt to the Washington County line; East St. Louis to Millstadt; Dupo to East St. Louis; East St. Louis to the Madison County line; East St. Louis to Caseyville; Centreville to Caseyville; French Village to O'Fallon.

Free Course in Highway Engineering at State University

The State University of Lexington, Ky., will give a short free course in highway engineering from Jan. 5 to Jan. 17, 1914.

The course will be divided into morning and afternoon sessions. During the former, lectures will be given by engineers and specialists in road building. The afternoon sessions will be devoted to practical field and office work, including the use of the transit and level, plotting profiles, laying grade lines and making estimates of costs.

The program of the course is as follows:

TUESDAY, JAN. 6.

10 a. m.—Address of welcome, Henry S. Barker, President of Kentucky State University.

11 a. m.—"Needs of Good Roads," Prof. Walter E. Rowe, Dean College of Civil Engineering, State University.

1.30 p. m.—Organization of Field Parties.

WEDNESDAY, JAN. 7.

8 a. m.—"Highway Engineering," D. V. Terrell, Professor of Highway Engineering, State University.

9 a. m.—"Construction of Macadam Roads," M. D. Ross, Assistant State Highway Engineer, Frankfort, Ky.

10 a. m.—"Alinement and Grades of Country Roads," R. H. Reese, First Assistant State Highway Engineer, Frankfort, Ky.

11 a. m.—"Design of Bridges," Professor Walter E. Rowe.

1.30 p. m.—Field and Office Practice.

THURSDAY, JAN. 8.

8 a. m.—"Highway Engineering," Professor Terrell.

9 a. m.—"Reconstruction of Macadam Roads," R. H. Reese, First Assistant Highway Engineer, Frankfort, Ky.

10 a. m.—"Tests for Road Building Material," Dr M. D. Maxon, Professor of Chemistry, State University.

11 a. m.—"Maintenance of Earth and Gravel Roads," M. D. Ross, Assistant State Highway Engineer, Frankfort, Ky.

FRIDAY, JAN. 9.

8 a. m.—"Highway Engineering," Professor Terrell.

9 a. m.—"Brick Pavements," William P. Blair, Secretary National Brick Paving Association, Cleveland, Ohio.

11 a. m.—"Road Law and Duties of County Engineers," Judge Lyman Chalkley, Professor of Law, State University.

1.30 p. m.—Construction of Brick Roads," William P. Blair, Secretary National Brick Paving Association, Cleveland, Ohio.

SATURDAY, JAN. 10.

8 a. m.—"Highway Engineering," Professor Terrell.

9 a. m.—"Bridge Floors and Material for Construction," W. J. Carrel, Professor of Bridge Engineering, State University.

11 a. m.—Question Box.

1.30 p. m.—Inspection of roads in the vicinity of Lexington.

MONDAY, JAN. 12.

8 a. m.—"Highway Engineering," Professor Terrell.

9 a. m.—"Road Legislation," R. C. Terrell, Commissioner of Public Roads, Frankfort, Ky.

10 a. m.—"Design of Bridges," Professor Rowe.

11 a. m.—"County Organization," J. Russel Gaines, President County Roads Engineers' Convention and County Engineer of Jefferson County, Louisville, Ky.

1.30 p. m.—Field and Office Practice.

TUESDAY, JAN. 13.

8 a. m.—"Highway Engineering," Professor Terrell.

9 a. m.—"Estimates and Contracts," Professor Rowe.

10 a. m.—"Interpretation of Specifications for Asphalt and Bituminous Materials," Professor T. F. Ott, Chemistry Department, State University.

11 a. m.—"Rock Asphalt as a Road Material," R. C. Terrell, Commissioner of Public Roads, Frankfort, Ky.

1.30 p. m.—Field and Office Practice.

WEDNESDAY, JAN. 14.

8 a. m.—"Highway Engineering," Professor Terrell.

9 a. m.—"Earth Roads," George D. Marshall, U. S. Highway Engineer, Washington, D. C.

10 a. m.—"Design of Bridges," Professor Rowe.

1.30 p. m.—"Road Material, Gravel and Broken Stone," George D. Marshall, U. S. Highway Engineer, Washington, D. C.

2.30 p. m.—Field and Office Practice.

THURSDAY, JAN. 15.

8 a. m.—"Highway Engineering," Professor Terrell.

9 a. m.—"Drainage of Roads," George D. Marshall, U. S. Highway Engineer, Washington, D. C.

10 a. m.—"Interpretation of Specifications for Asphalt and Bituminous Materials," Professor T. F. Ott, Chemistry Department, State University..

1.30 p. m.—"Binders and Fillers for Gravel and Macadam Roads," George D. Marshall, U. S. Highway Engineer, Washington, D. C.

FRIDAY, JAN. 16.

8 a. m.—"Highway Engineering," Professor Terrell.

9 a. m.—"Geological Formations of Rocks in Kentucky, with Reference to Road Building Material," Professor A. M. Miller, Dean College of Arts and Science, State University.

10 a. m.—"Dust Preventatives and Oil Treatments," J. F. Grimes, Assistant State Highway Engineer, Frankfort, Ky.

11 a. m.—"Design of Bridges and Estimates of Cost," W. J. Carrel, Professor of Bridge Engineering, State University.

1.30 p. m.—Field and Office Practice.

SATURDAY, JAN. 17.

8 a. m.—"Highway Engineering," Professor Terrell.

9 a. m.—"Split Log Drag," J. F. Grimes, Assistant State Highway Engineer, Frankfort, Ky.

10 a. m.—Question Box and General Discussion.

Work on El Camino Real

The work of graveling El Camino Real, between Las Cruses, N. M., and the Texas state line, a distance of 25 miles, is being carried on rapidly by the Dona County Board.

At present there are over 400 teams engaged in the construction of the county's new system of graveled highways. These roads are being built with a gravel surface, 8 ins. deep.

The members of the local road board are: W. S. Gilliam, Francis E. Lester and P. H. Bailey.

Grade Crossings in Germany

During the year 1911, according to the "Daily Consular and Trade Reports," there were 94,127 highway grade crossings on the full-gauge railroads of Germany. Of this number, there were 6,237 at which the streets passed over the tracks and 15,921 at which they passed under.

Despite the fact that the railway administration of Germany is pursuing a policy of grade crossing elimination there were 573 persons killed or injured in 1911, and 10,105 accidents of all kinds to motor vehicles. A number of these accidents, the report states, were the result of carelessness on the part of the victims themselves.

Convict Labor Proposed in Texas

Governor O. B. Colquitt, of Texas, stated recently that he believed 1,000 miles of improved roads could be built in Texas annually by the use of convict labor and the levying of an automobile tax.

"I would recommend," said Governor Colquitt, "the passage of a law creating the office of state highway engineer, the collection of a just tax against automobile owners to be used under proper regulations where the counties would contribute twice as much as the state appropriation, and the proper use of "trusty" convicts in the construction of good roads throughout the state. In this way 1,000 miles of good roads could be built every year at a minimum cost to the county and a profit to the state."

Road Bonds Issue Carried in Collins County, Texas

The citizens of Collins County, Tex., recently voted in favor of issuing $450,000 in bonds, the proceeds to be used in the construction of 90 miles of macadam highways, diverging in all directions from McKinney.

Over 14 miles of these roads will be on a portion of the Oklahoma, Texas and Gulf Highway, which, with 26 miles of model roads, starting 3 miles north of the Red River and extending south through Denison and Sherman, and the 15 miles of rock roads to be built in Dallas County, will leave only 19 miles of dirt road on the Texas division of the highway, which extends from Dallas to Oklahoma City, Okla. In preliminary work of constructing the highway, M. J. Milburn, of Pauls Valley, has been engaged as Field Secretary, and the Field Engineering Co., of Denison, as consulting engineers.

The Byrnes Federal Aid Bill

A bill providing for highway improvement work by the United States Department of Agriculture in cooperation with the highway departments of the various states, has recently been introduced into Congress by James F. Byrnes, of South Carolina.

The object of the bill, as stated, is to promote the adoption of better methods of road construction and maintenance, and to assist in the development of an adequate system of improved roads, through the cooperation of the Department of Agriculture and the highway departments. This work, according to the bill, will embrace practical demonstrations in road construction by the Secretary of Agriculture and representatives of the state highway departments.

The bill also provides for the appropriation of $3,000,000 for the fiscal year ending June 30, 1914; $6,000,000 for the fiscal year of 1915, and $12,000,000 each fiscal year thereafter for the purpose of carrying out the provisions of the bill.

Page Numbers in This Volume

Through an error in make-up, the pages in this volume of "Good Roads" are in error in the issues of December 6, 13, 20 and 27. The last page in the issue of November 29 was 252 and the first page in the issue of December 6, therefore, should have been 253. Instead, it was numbered 353. The attention of readers is directed to this so that they will not think that any pages are missing.

Shade Trees in Paris

According to a report in a recent issue of the "Daily Consular and Trade Reports," an average of 1,100 to 1,200 new trees are planted along the streets and boulevards in Paris yearly to replace those which have died or have been destroyed by automobiles or other vehicles. This work is under the supervision of a special administrative department of the prefecture of the Department of the Seine known as the "Direction Administrative des Service d'Architecture et des Promenades et Plantations." During the year 1912 there were 86,686 shade trees on the streets, boulevards and squares of Paris, and the cost of maintaining them amounted to 500,000 francs.

The report also describes the methods now employed in planting, transplanting, grafting, upkeep and watering of the trees. At the present time the total number of trees are divided as follows: Platanus, 27,321; Acer, 10,529; Æculus, 16,705; Ulmus, 13,965; Ailanthus, 6,820; Paulownia, 1,046; Robinia, 3,747; Tilia, 3,317; Cedrela, 1,531; Sophora, 878; Juglans, 284; Zelkova, 26; Pterocarya, 439; Sorbus, 34; Populus, 26; Quercus, 1; Catalpa, 1; and Fraxinus, 16.

The Commissioners' Court of Reeves County, Tex., has ordered that an election be held on Jan. 24 to vote on issuing road bonds to the amount of $100,000.

The County Court of Cole County, Mo., has recently purchased a complete road building outfit, including a tractor, road graders and ditchers, in preparation for the highway improvement work to be done in 1914.

The Oak Lawn Club, of Houston, Tex., at a recent meeting adopted a resolution urging the immediate improvement of the Harrisburg Road, between Milby St. and the city limits.

The Commissioners' Court of Bell County, Tex., has ordered an election for Jan. 15 in Road District No. 5 to determine whether or not $600,000 in road bonds shall be issued. The construction of 80 miles of roads in the territory outside of Temple and the paving of several streets in Temple is proposed.

A list of streets to be improved in 1914 in Leon, Iowa, was presented to the City Council at a recent meeting. The following streets are included in the list: Main St., between 16th St. and the railway station; Main St., between First and Seventh Sts.; Church St., between Seventh and 11th Sts.; 11th St., between Church and Main Sts., and First St., between Church and Main Sts.

The sum of $80,000 is now available in Muscatine County, Iowa, for improvements to be made to rural highways during 1914. Of this sum $25,000 will be expended on the township roads, and the remainder will be placed at the disposal of the Board of Supervisors for the improvement of highways included in the county system. Of the amount to be expended under the direction of the supervisors, $29,000 will be used in bridge construction and maintenance.

Expenditures for Road Building in the United States in 1904 and 1912 are shown by statistics which have been compiled by the Office of Public Roads of the U. S. Department of Agriculture. According to the comparison, the total expenditures on all public roads in 1904 was $79,771,417, while the amount spent for this purpose in 1912 was $164,232,365, or $37.07 per mile of public roads in 1904, as against $74.65 per mile in 1912. The expenditure per person in the United States in 1904 was $1.05 and in 1912 $1.78.

Street Work in Quincy, Illinois

At a recent meeting of the City Council, of Quincy, Ill., a list of streets to be improved in 1914 was presented. A resolution was then adopted directing the City Engineer to prepare estimates of the cost of the proposed improvements.

The list of streets is as follows: 20th St., between Maine and Cedar Sts.; South Front St.; South 8th St., between Jackson and Bridge Sts.; South 12th St., between State and Harrison Sts.; Main St., between Hampshire and Vermont Sts.; Chestnut St.; between 6th and 8th Sts.; Maiden lane, between 3d and 6th Sts.; Vine St., between 4th and 20th Sts.; Lind St., between 8th and 12th Sts.; Jersey St., between 14th and 20th Sts., Payson Ave., between 12th and 14th Sts.; 20th St., between Maine and State Sts.; Vermont St., between 24th and 27th Sts.; Hampshire St., between 18th and 25th Sts.; and 20th St., between Maine and Cedar Sts.

Course in Highway Engineering at the Case School of Applied Science

A free course in highway engineering will be given from Jan. 19 to Jan. 31 by the Department of Civil Engineering of the Case School of Applied Sciences, Cleveland, Ohio. The object of the course is to give engineers, contractors, inspectors, prospective applicants for positions in the state highway service, and others interested in road building a more thorough knowledge of the subject.

The course will be given in the form of morning and afternoon lectures, treating the various phases of highway engineering, including general highway economics and the construction and maintenance of the various types of highways. In the afternoon lectures and in laboratory work the various materials of construction, including cement, concrete, paving brick, crushed stone, will be studied. In addition to the lecture and laboratory work, which will be under the supervision of Maurice B. Greenough, Instructor in Civil Engineering, Case School of Applied Sciences, and the lectures by James R. Marker, State Highway Commissioner of Ohio, and other specialists in highway engineering, general discussions of the costs of construction and maintenance will be held. Additional lectures will also be given on culverts and bridges.

Plans for Road Work in Pennsylvania Proposed by State Grange

At a meeting of the Pennsylvania State Grange held recently in Reading, Pa., John A. McSparran, chairman of the legislative committee, in his report, recommended that the control of road work be placed in the hands of the local officials, that a superintendent be appointed to oversee the work of the supervisors in the various counties, and that a highway department be created at Harrisburg to prepare specifications, and, from time to time, issue bulletins on road building and maintenance.

According to the report, it would require the sum of $7,000,000 annually from the state to finance the proposed system. Mr. McSparran suggested that if the money was not available under the present system of taxation it could easily be realized by a more equitable system. The use of convict labor upon the roads, under public supervision, was also advocated at the meeting.

Following the reading of the report, William T. Creasy addressed the gathering, speaking on the necessity of economy of the state's money in road building. Other speakers were: Moses E. Clapp, of Minnesota; Clyde Kelly, of Pittsburgh; Congressman Fred. E. Lewis, of Allentown; Empire Stevens, agriculturist of the Lehigh Valley Railroad; M. C. McDowell, of Pennsylvania State College, and R. A. Bishop, of the Doylestown Agricultural School.

MEETINGS

Tidewater Automobile Association

The Tidewater Automobile Association, of Tidewater, Va., held its first annual banquet at the Monticello Hotel on Dec. 12. The banquet was attended by many highway officials, including George P. Coleman, State Highway Commissioner of Virginia, who spoke in favor of organizing a Norfolk and Richmond highway association, for the purpose of furthering the proposed Norfolk-Richmond boulevard, between Virginia Beach, Norfolk, Portsmouth, Suffolk and Richmond, and securing assistance from the various counties through which the boulevard will pass.

In his address Commissioner Coleman said that in seven years the sum of $6,364,000 had been spent in highway construction and maintenance in Virginia; and that last year the sum of $1,411,000 was spent and 619 miles of improved highways were built. During the seven years, said Commissioner Coleman, between 2,000 and 2,100 miles of highways were constructed in the state. During the present year the following amounts were given to the various counties to assist them in their road building: Norfolk County, $13,760; Princess Anne County, $1,800; Nansemond County, $3,306; Southampton County, $5,238.

Various routes for the proposed Norfolk-Richmond boulevard were suggested by several of those present, including Mayor T. M. Kilmartin, of Waverly, who advocated the building of the boulevard through Waverly and Sussex. Maurice G. Long, of Norfolk, formerly Road Supervisor of Norfolk County, then spoke on the importance of road maintenance. He strongly advocated more complete cooperation between the farmers and residents of the cities in the construction and maintenance of rural highways.

The next speaker was J. J. Dalton, Road Engineer of Norfolk County, who spoke on the highway situation in that county. According to Mr. Dalton, the sum of $60,000 is being spent annually in road construction and maintenance in Norfolk County. He stated that a better maintenance system was needed in the county, and that the county road department was now working towards that end.

Those in charge of the banquet were: W. F. Clark, chairman of the arrangement committee; Moe Levy, President, and John A. Lesner, Vice President.

The Clarke County Good Roads Association, of Berryville, Va., held a meeting on Dec. 20 at the Battletown Inn for the purpose of perfecting its organization.

A meeting of property owners was held recently in Seattle, Wash., for the formulation of plans for street improvement for next spring. Lloyd Clark presided over the meeting, which was attended by about 40 persons.

The Imperial Valley Good Roads Convention was held in El Centro, Cal., recently for the purpose of selecting a route for the proposed plank road from Arizona into the Imperial Valley.

A good roads meeting was held recently in Temple, Tex., for the purpose of petitioning the Commissioners of Bell County to settle upon Jan. 15 as the date for holding the $600,000 good roads bond election. The meeting was attended by 500 persons representing the entire improvement district, including Justice Precinct No. 5 and the towns of Heidenheimer and Little Rock.

The Hubbard Good Roads Club was organized at a recent meeting in Hubbard, Iowa., and the following officers were elected: David Tod, President; M. V. Leslie, Vice President; Oscar Stephens, Secretary and Treasurer. The club was formed for the purpose of securing highway improvement in Hardin County.

COMING MEETINGS

January 14-15, 1914.—Arkansas Good Roads and Drainage Association.—12th Annual Convention, Little Rock, Ark. Secretary, George R. Brown, Little Rock, Ark.

January 26-27.—Texas Good Roads Association.—Annual meeting, Fort Worth. Secretary, Homer D. Wade, Stamford, Tex.

February 16-20, 1914.—National Association of Cement Users.—10th Annual Convention, Chicago, Ill. Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.

February 16-20, 1914.—National Conference on Concrete Road Building.—Auditorium Hotel, Chicago, Ill. Secretary, J. P. Beck, 72 West Adams St., Chicago, Ill.

Arkansas Good Roads and Drainage Association

The Arkansas Good Roads and Drainage Association will hold its twelfth annual convention on Jan. 14 and 15 at Little Rock, Ark. The following is a brief synopsis of the tentative program: Invocation, Rev. Samuel Campbell, of Little Rock; Address of Welcome, Judge Joe Asher, of Little Rock; "Earth Road Construction and Maintenance," E. A. Kingsley, State Highway Engineer, of Little Rock; "The Roads of Northeast Arkansas," C. W. Highfall, of Paragould; "The Arkansas Good Roads Law; Its Purpose and Results," A. V. Smith, of Banks; "Brinkley, Little Rock, Memphis Highway; A Link in Arkansas of the Southern National Highway," Dr. E. B. McKnight, of Brinkley; "The Great Highway and Its Benefit to Arkansas," Dell M. Potter, of Clifton, Ariz., President of the Southern National Highway Association; "The Roads of Arkansas and Their Importance," J. M. Futrell, of Paragould; "The Levee Situation," Charles H. Miller, of Little Rock; "Where I Stand on Road Legislation," Governor George W. Hays, of Arkansas; "The Interest of the Rural District to Good Roads," Heartsill Regan, of Clarksville.

W. A. Coker, of Monticello, is President of the association; J. T. Angelo, of Augusta, is Vice President, and George R. Brown, of Little Rock, Secretary and Treasurer.

It is reported that the American Highway Association and the American Automobile Association will hold the Fourth American Road Congress at Atlanta, Ga., in October or November of next year.

PERSONAL NOTES

J. E. Ballemger has been appointed County Engineer of Duval County, Fla.

D. O. Thomas, of Belleville, Mo., has been appointed Highway Engineer of St. Clair County, Mo.

George T. Clark has tendered his resignation as City Engineer of Saskatoon, Sask., to take effect on Feb. 1, 1914.

W. R. Roy, of Spokane, Wash., has been appointed State Highway Commissioner of Washington, to succeed W. J. Roberts, M. Am. Soc. C. E., resigned.

H. M. Waite, City Engineer of Cincinnati, Ohio, has been appointed City Manager of Dayton, under the new commission form of government.

Walter G. Kirkpatrick has resigned as City Engineer of Birmingham, Ala., his resignation to take effect Jan. 11, 1914. He will be succeeded by Maury Nicholson, Assistant City Engineer.

S. D. Lehr, formerly City Engineer of Allentown, Pa., has been elected one of the five commissioners of the city under the commission government, recently authorized by the Pennsylvania Legislature.

B. H. Davis, consulting engineer of New York, N. Y., has been appointed to prepare plans and supervise the engineering work in connection with the building of the proposed $1,000,000 reinforced concrete viaduct across the Merrimac River at Lawrence, Mass.

E. J. McCaustland, M. Am. Soc. C. E., Professor of Municipal and Highway Engineering at the University of Washington, Seattle, Wash., has been appointed consulting engineer for King County, to supervise the expenditure of the $3,000,000 bond issue recently voted for highway improvement, in connection with State Highway Commissioner Roberts, whose appointment as consulting engineer was noted in the Dec. 6 issue of "Good Roads."

NEWS OF THE TRADE

The American Road Machinery Co., formerly the American Road Machine Co., which is a combination of the American Machine Co., of Kennett Square, Pa.; Climax Road Machine Co., of Marathon, N. Y.; Monarch Road Roller Co., of Groton, N. Y.; Indiana Road Machine Co., of Fort Wayne, Ind., and the Lima Contractors' Supply Co., of Delphos, Ohio, has issued $1,000,000 seven per cent. cumulative stock, $100 par value, in order to provide additional working capital. Of the $1,000,000 preferred stock issued, $700,000 has already been taken up by the former stockholders of the constituent companies, the remaining $300,000 being sold as working capital. In the prospectus issued by the underwriter, the company's net tangible assets are stated as $2,442,267, of which $1,531,422 are net quick assets. The management of the company, according to the prospectus, remains in practically the same hands as have carried it on for years. S. Jones Philips, president of the company, has also been secretary and general manager since 1886. The board of directors consists of the following: Adolphe E. Borie, Chairman; R. G. Hutchins, Jr., Vice President, National Bank of Commerce, New York; James Imbrie, of William Morris Imbrie & Co., New York; A. Ludlow Kramer, Vice President, Equitable Trust Co., New York; J. M. Landerberger, Manager of Fort Wayne plant, Fort Wayne, Ind.; William G. Maloney, Wilmington, Del.; Charles Page Perin, of New York, N. Y.; S. Jones Philips, President of the company; H. G. Prout, Vice President, Union Switch & Signal Co.; William West, of Henry & West, Philadelphia, Pa.

The Galion Iron Works Co., of Galion, Ohio, announces that it is increasing its capital stock from $150,000 to $1,000,000 in order to enable it to care for its rapidly increasing business. The name of the company has also been changed to the Galion Iron Works & Manufacturing Co. The reorganization of the company is being conducted under the direction of Squires-Sanders & Dempsey, Attorneys, of Cleveland, Ohio.

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